# COMMERCIAL FISHERIES ABSTRACTS

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FISH TECHNOLOGY EXPERIMENT STATION.
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U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

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## BUREAU OF COMMERCIAL FISHERIES

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C.F.T.R.I.
FISH TECHNOLOGY EXPERIMENT STATION

0.5 BACTERIOPHAGE CLEARANCE IN THE OYSTER (CRASSOSTREA VIRGINICA)

(*)

Acton, Ronald T., and E. Edward Evans (Department of Microbiology, University of Alabama Medical Center, Birmingham 35233)

Journal of Bacteriology 95, No. 4, 1260-1266 (April 1968)

Because relatively few quantitative immunological studies have been conducted with invertebrates, this study was designed to learn more about the immune potential of the oyster, a representative mollusk. During the study of the immune responsiveness of lower animal forms, the authors examined the oyster, Crassostrea virginica, with the three following types of immune mechanisms in mind: (1) cellular response, which is characterized by the clearance of antigen via phagocytosis; (2) humoral responses, which may be characterized by the formation of immunoglobulins or immunoglobulinlike substances; and (3) ability to exercise immunological memory. Previous investigations had shown that the oyster is quite capable of clearing injections of erythrocytes, bacteria, bacteriophage, and soluble material; however, the immunological nature of antigen clearance in the oyster has not been shown. The results from the present experiment are compared with data on phage clearance from other invertebrates and vertebrates.

The experiments measured the primary and secondary rates of clearing T2 coliphage in the oyster. The fate of phage injected intracardially or intramuscularly was traced by measuring serum and tissue fluid plaque-forming unit

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*Item on back of card.

 ABSTRACTER: M. F. Tripple

1.3 FOOD AND FEEDING BEHAVIOR OF PACIFIC SALMON.
I - THE STRATIFICATION OF FOOD ORGANISMS IN THE STOMACH

Ueno, Motokazu (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)

Bulletin of the Japanese Society of Scientific Fisheries 34, No. 4, 315-318 (April 1968) (In English)

For the past 15 years, scientists have been interested in the stomach contents of Pacific salmon. Ito (1964) reported that the main diet of chum, sockeye, and pink salmon caught in the North Pacific consisted of amphipods, copepods, euphausiids, squid, and myctophids. Allen (1958) noted that the stomach contents of these salmon were not always mixed but were often noticeably stratified. Believing that an analysis of the stratification of food in the stomachs of salmon would help clarify the relation between the occurrence of food organisms and the behavior of salmon in the ocean, the present author examined the fish aboard a salmon mother ship during the May-July 1966 fishing season. He collected and analyzed the stomach contents of 240 chum salmon (Oncorhynchus keta), 630 sockeye salmon (O. nerka), and 360 pink salmon (O. gorbuscha) caught in the area bounded by 48°30′ N., 169°30′ E. and 58°10′ N., 177°15′ W.

In general, the stomach contents of chum consisted of myctophids, squids, euphausiids, amphipods, and pteropods. Although most of the food was nearly digested, it was noticeably stratified in 12 of the stomachs. In 10 of the 12,

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 ABSTRACTER: L. Baldwin

0.5 INCIDENCE OF CLOSTRIDIUM BOTULINUM TYPE E IN SALMON AND OTHER MARINE FISH IN THE PACIFIC NORTHWEST

Craig, James M., Sidney Hayes, and K. S. Pilcher (Department of Microbiology, Oregon State University, Corvallis 97331)

Applied Microbiology 16, No. 4, 553-557 (April 1968)

Clostridium botulinum has recently been identified in marine sediments from the Gulf of Mexico and the Pacific coast; it has also been found in several species of fish and in shrimp. The organism has been reported present in a large percentage of Dungeness crabs collected in the Pacific Northwest. This survey was undertaken to study the incidence of C. botulinum Type E in the major species of fish and shellfish of the Pacific Northwest. Salmon, sole, cod, clams, oysters, and crabs from ocean waters along the coasts of Oregon and Washington were examined. C. botulinum was detected by identifying Type E toxin in enrichment cultures of the viscera of individual samples.

A significant percentage of the specimens from sockeye, chinook, and coho salmon gave rise to culture filtrates that were toxic to mice. The proportion varied from about 8 percent for all groups of coho salmon to about 24 percent for sockeye salmon. The majority of specimens successfully typed contained Type E botulinum toxin. Two specimens of sockeye salmon produced cultures containing Type A botulinum toxin and one specimen produced the rare Type F toxin. About 23 percent of the steelhead trout specimens yielded toxic culture filtrates, of

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 ABSTRACTER: M. F. Tripple

1.81 THE MISSISSIPPI OYSTER INDUSTRY

Maghan, Bruce W. (Exploratory Fishing and Gear Research Base, Pascagoula, Mississippi 39567)

Fishery Leaflet 607, 12 pp. (December 1967) (U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D.C. 20240)

The Eastern oyster (Crassostrea virginica) is common along the Gulf and Atlantic coasts of the United States. These oysters have been harvested from the coastal waters of Mississippi since precolonial days. The Eastern oyster reaches marketable size in 2 years in Mississippi waters. This report describes how the productive oyster areas are maintained and how certain reefs are lost to the fisheries. The report also explains the methods and equipment used in harvesting oysters and shows annual landings, their value, and the number of fishermen in the oyster fishery from 1928 to 1965.

In Mississippi waters, the oysters generally live in depths of less than 10 feet at mean low tide on stable bottoms that are not exposed to heavy wave action or to excessive amounts of fresh-water runoff. A typical oyster reef consists of a low mound with the heaviest concentration of oysters on the sloping shoulders. The second largest reef in Mississippi is about 630 acres, and it was producing $1,000 worth of oysters per day until it was closed by contamination. This reef is now a primary source of seed oysters. A 3,000-acre reef is currently the main source of oysters taken from Mississippi waters. The maintenance and rehabilitation of productive reefs that have been damaged by storms, droughts, parasites,

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 ABSTRACTER: M. F. Tripple

PHAGE CLEARANCE IN THE OYSTER

INCIDENCE OF CLOSTRIDIUM BOTULINUM IN PACIFIC NORTHWEST FISH

STRATIFICATION OF FOOD IN STOMACH OF SALMON

MISSISSIPPI OYSTER INDUSTRY

0.5

which five contained Type E toxin and two contained Type B toxin. About 11 percent of the sturgeon specimens produced toxic filtrates, all of which contained Type E toxin. These data indicated that C. botulinum, usually Type E, was present in a significant percentage of all the fish studied.

The proportion of specimens of a given salmon species harboring toxigenic organisms varied with the location at which the fish were collected. The proportion of chinook and coho salmon found to yield toxic cultures was higher among salmon caught in the Columbia River than among those caught in ocean waters. The authors conclude that the river is a more abundant source of the toxigenic bacteria than is the ocean, and that a large number of fish probably acquired the organisms only after entering the river. The percentage of steelhead found to produce toxic cultures was also relatively high and was similar to comparable figures for the Columbia River salmon.

The presence of C. botulinum was demonstrated in most of the sole and cod species examined. The proportion of specimens of English sole, red rock cod, and black cod harboring C. botulinum was quite high; in other species it was similar to the proportion found in ocean-caught salmon. It is sufficient to note that the organism was often present in these fish.

C. botulinum Type E was found in all species of clams examined; 66 percent or more of the cockle and soft-shell clams produced toxic cultures. The lowest proportion of toxic specimens was found in the razor clams. More than 33 percent of the oyster specimens produced toxic cultures, as did more than 50 percent of the crab specimens. The results make it clear that C. botulinum is commonly present in clams, oysters, and crabs along the Oregon coast. [16 references]

1.81 (Cross Reference: 1.0117)

and predators have long been practiced in Mississippi. Several oyster reefs have been closed in recent years as the result of municipal and industrial pollution, which is not necessarily toxic to oysters, but does render them unfit for human consumption.

The Eastern oyster can usually tolerate salinities of from 5 to 32 parts per thousand. Adverse climatic conditions can cause oyster mortalities by disrupting the environment. Excessive fresh-water runoff that reduces the salinity to less than 5 parts per thousand frequently occurs in Mississippi Sound. Salinity is increased during periods of little rainfall. Flood control levees on the Mississippi River have reduced the amount of fresh water entering the western portion of the Sound, and these waters have become more saline. The increase in salinity has been accompanied by an influx of predators.

Between 1960 and 1965, the annual catch of oysters averaged 1,868,900 pounds, the value of the catch averaged $533,400, and the number of men engaged in the fishery averaged 1,511. The figures for catch, value, and number of fishermen all show a decline in 1965; these declines and other variations are attributed to pollution, predators, adverse weather, and changes in salinity. Despite these reductions, recent annual average catches and values show considerable improvement over the figures for 1945 to 1959. Additional increases in oyster harvests are anticipated through increased planting activities and changes in fishing regulations to allow more extensive use of dredges and to open reefs after the pollution has abated.

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levels at various times after injection. Phage-neutralizing activity was measured.

Circulating T2-neutralizing antibody was not induced in the oyster; however, secondary injections of T2 were cleared more rapidly than primary injections were. The main difference between clearance rates of the shore crab (Carcinus maenas) and the oyster is that the oyster seems to be able to handle antigen more efficiently. Two shore crabs cleared a primary injection of phage in 42 and 72 days, respectively, and secondary clearance occurred in 14 and 42 days. Although the oyster received a higher dose of phage, a secondary injection of phage was cleared from the hemolymph of the oyster within 48 hours.

The oyster appears to be less efficient than the lemon shark in clearing and disseminating phage. The lemon shark can clear a primary injection of phage within 72 to 96 hours. Secondary injections were usually cleared immediately due to the presence of phage-neutralizing antibody. The oyster was slower in clearing phage from the tissues; a primary injection was not cleared until the 63rd day and the secondary injection till the 28th day. Another difference between the clearance of phage in the oyster and most vertebrates is that secondary clearance does not seem to be associated with humoral antibody and is probably mediated by cells. [36 references]

1.3 (Cross Reference: 9.12)

euphausiids had been eaten first, followed by amphipods (in 9) or pteropods (in 1); in the other 2, copepods had been eaten first and then euphausiids.

The stomachs of sockeye contained copepods, euphausiids, amphipods, squids, and myctophids. The food in 37 of these stomachs was stratified. In 28, copepods had been eaten first, followed by amphipods (in 16) or euphausiids (in 12). In 4, euphausiids had been eaten first and then copepods. In 5, euphausiids had been preceded by squids (in 4) or myctophids (in 1).

The stomachs of pink salmon contained copepods, euphausiids, amphipods, myctophids, and young fish. The stomach contents of 39 of these salmon were stratified. In 15, euphausiids had been eaten before amphipods; in 19, copepods had been eaten before euphausiids (12 salmon) or amphipods (by 7 salmon); in 4, myctophids had been eaten before euphausiids; and in 1, young fishes had been eaten before amphipods.

Because the samples were collected by gill nets at various times during the night, irrespective of the salmon's recognized feeding habits, indications of stratification were considered inconclusive. The author suggests that, in the future, samples be collected at specified intervals throughout the night.

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Chemical Abstracts 68, No. 19, 85103n (May 6, 1968)
France)

Chaigneau, Marcel, and Edmond Lagarde (Lab. Gaz C.N.R.S., Fac. Pharm., Paris,

0.5 COMPOSITION OF THE GASES RELEASED BY VARIOUS STRAINS OF MARINE DENITRIFYING BACTERIA

COMPOSITION OF GASES RELEASED BY BACTERIA

1.84 U.S. SCALLOPS FISHERY -- SWITCHING COASTS?

Anonymous
Fish Boat 13, No. 5, 24-26 (May 1968)

The arrival of an Alaskan scallop dragger in Kodiak with 30,000 pounds of Alaska scallops (Patinopecten caurinus) taken after only 30 hours of dragging has created interest in an entirely new marine industry for Alaska. If Alaska's scallop stocks prove to be plentiful, Alaska might have a new fishing industry. The dragger was a converted Alaskan king-crab fishing boat fitted with special drags and winches. The captain was an experienced scallop fisherman from Massachusetts.

One problem in the prospective scallop fisheries has been the cost of removing the meat from the scallops. The first scallop catches were delivered in the round, and it was up to the buyer to undertake the costs of shucking. The in-the-round-method was possible on a converted crab boat because the scallops were kept in the crab tanks with circulating sea water. Due to the inexperience of the factory workers, removal of the scallop meat proved to be fairly costly. As a result of this situation, the fishermen are preparing to shuck the scallops at sea, which is the common practice on the Atlantic coast.

A fisheries authority has observed that scallop boats fishing on the Atlantic coast work 6 hr. on and 6 hr. off, for 24 hr. per day. Most of this time is
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 ABSTRACTER: M. F. Tripple

2.01 ACTION OF MICROORGANISMS ON THE PEROXIDES AND CARBONYLS OF RANCID FAT

Smith, James L., and John A. Alford (Eastern Utilization Research and Development Division, U.S. Department of Agriculture, Beltsville, Maryland 20705)
Journal of Food Science 33, No. 1, 93-97 (January-February 1968)

Microorganisms can decompose hydroperoxides and can use aldehydes; however, there are no reports on the action of microorganisms on rancid fats that contain hydroperoxides and carbonyls. Carbonyl compounds are formed by the decomposition of hydroperoxides and have been found to cause flavor changes in some foods. Therefore, the authors decided to investigate the effect of microorganisms on the peroxides and monocarbonyl content of rancid lard.

The effects of 26 species of bacteria, molds, and yeasts on the hydroperoxides and monocarbonyls in rancid fat were determined. All the microorganisms were capable of decomposing the hydroperoxides. The activity of microorganisms on the monocarbonyl content of the rancid fat was so varied that the authors divided it into four groups.

Group I--microorganisms that produced large increases in at least two of the monocarbonyl classes. The activity of Aspergillus flavus in removing peroxides, coupled with the sharp increases in 2,4-dienals, alkanals, and methyl ketones,
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 ABSTRACTER: M. F. Tripple

2.01 EFFECT OF LOW-LEVEL RADIATION ON THE PROTEOLYTIC ACTIVITY OF BACTERIA IN OYSTERS

Liuzzo, Joseph A., Mohamed K. Farag, and Arthur F. Novak (Department of Food Science and Technology, Louisiana State University, Baton Rouge 70803)
Journal of Food Science 32, No. 6, 678-681 (November-December 1967)

Effect of radiation on bacteria.--This study was designed to determine the effect of radiation on the bacteria present in oysters as determined by Sørensen's formol activity of bacteria that survived radiation doses of 0.1 and 0.8 Mrad. Irradiation of the oysters did not contribute to proteolysis; however, inoculation of sterile oyster media with surviving bacteria did result in proteolysis. After 5 days of incubation, the proteolytic activity of nonirradiated bacteria and and of bacteria irradiated at 0.1 Mrad did not differ appreciably, but there was a significant decrease in activity of bacteria irradiated at 0.8 Mrad. After 15 days, the activity of Pseudomonas erythra, of an unidentified species of Pseudomonas, and of Achromobacter butyri increased significantly; Protaminobacter alboflavus and an unidentified species of Flavobacterium increased less markedly. The results emphasized that proteolysis in oysters is primarily due to bacterial metabolism and not to autolytic mechanisms.

Effect of radiation level on proteolytic activity.--This study was conducted to determine the level of radiation between 0.0 and 0.9 Mrad that produced a definite change in bacterial proteolysis of the oyster tissue. A radiation level of
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 ABSTRACTER: M. F. Tripple

2.05 (*) SALMONELLAE ASSOCIATED WITH FURTHER-PROCESSED TURKEY PRODUCTS

Bryan, Frank L., John C. Ayres, and Allen A. Kraft (U.S. Public Health Service, Bureau of Disease Prevention and Environmental Control, National Communicable Disease Center, Atlanta, Georgia 30333, and Iowa State University of Science and Technology, Ames, Iowa 50012)
Applied Microbiology 16, No. 1, 1-9 (January 1968)

Because of the increased demand for and production of "further-processed" and cut-up turkey products, and because of the documentation of outbreaks of salmonellosis caused by turkey meat, this study was made to assess the incidence of salmonellae on further-processed turkey meat and to determine the sources of contamination at commercial turkey-processing plants.

Further-processed turkey products were prepared from chilled, eviscerated, and thawed carcasses at two commercial turkey-processing plants. These products were then evaluated for the presence of salmonellae. Salmonellae organisms were isolated from swab samples taken from 12 percent of the chilled, eviscerated turkey carcasses, 27 percent of the finished products, and 24 percent of the processing equipment. The same serotypes of salmonellae as those found throughout a plant were recovered from 31 percent of the rinse-samples taken from hands and gloves of processing personnel. Salmonellae were found in samples taken on 37 out of 48 visits to the processing plants. More recoveries were made on days when freshly killed turkeys were processed (87 percent) than when frozen-defrosted
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 ABSTRACTER: M. F. Tripple

PROSPECTIVE ALASKA SCALLOP FISHERY

EFFECT OF IRRADIATION ON BACTERIA IN OYSTERS

ACTION OF MICROORGANISMS ON RANCID FAT

SALMONELLAE ASSOCIATED WITH TURKEY PRODUCTS

2.01 (Cross Reference: 3.15)

0.2 Mrad was sufficient to cause a marked reduction in the proteolytic activity of 6 of the 10 cultures. Neisseria flavescens, N. sicca, Paracolobactrum intermedium, and Bacillus laterosporus showed definite breaks in their proteolytic trends at the 0.4-Mrad level. Viable plate counts of the surviving bacteria continued to increase during the 15-day period of incubation. The most notable increases were shown by the two Pseudomonas species; the Flavobacterium sp., Alcaligenes metalcaligenes, and B. laterosporus also increased. Comparatively high counts were seen for A. butyri and P. alboflavus during the study. The observations that subjecting the bacteria to radiation resulted in definite decreases in their numbers and that the most notable decreases were seen at the 0.8-Mrad level for the surviving bacteria emphasized the value of radiation in reducing the numbers of bacteria in a food and extending storage periods.

Total numbers of surviving bacteria.--At this stage of the investigation, the authors concluded that a reduction of proteolysis, which was induced by irradiation of the bacteria, was due to an impairment of the physiological mechanisms of the bacteria, a reduction in their numbers, or both. The decreases seen in proteolysis and bacterial numbers after irradiation suggested a relation existed between the two phenomena. Consequently, correlation coefficients were determined between the numbers of bacteria surviving radiation and the degree of proteolysis shown by each bacterium to determine the statistical significance of this relation. The coefficients indicated that the reductions in proteolysis were significantly correlated at the 1-percent level of probability with the decrease in bacterial numbers for all species except P. alboflavus, which showed a coefficient significant at the 5-percent level. [13 references]

2.05

carcasses were processed (59 percent). The predominant serotype of salmonellae isolated from the meat and environment usually changed between sampling times. Salmonella sandiego and S. anatum were the most frequent serotypes among the 23 recovered. Most of the isolated serotypes are commonly associated with turkeys and have been indicated as a causative agent of human salmonellosis. The authors conclude that further-processed turkey products could directly transmit salmonellae if inadequately cooked by the consumer and if improperly refrigerated between the time of manufacture and time of consumption. These turkey products might also contaminate other foods by introducing salmonellae into food-preparation areas. [25 references]

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2.05 AVIRULENT CLOSTRIDIUM PERFRINGENS STRAINS OBTAINED BY EUFLAVINE TREATMENT

Paquette, G. (Institute of Microbiology and Hygiene of the University of Montreal, Laval des Rapides, Quebec, Canada), and V. Fredette
Journal of Bacteriology 94, No. 5, 1437-1442 (November 1967)

The purposes of this study were to determine if the capacity of Clostridium perfringens Type A to synthesize α-toxin could be altered by euflavine and to determine what effects might be expected when the euflavine-treated cultures are injected into animals. C. perfringens was incubated in the presence of euflavine. The resistant mutants thus isolated had highly reduced capacity to release α-toxin. This reduced capacity was confirmed by lecithinase determinations and by immunoelectrophoresis. These mutants were completely avirulent when injected into guinea pigs and into 6- to 7-day-old chicks. A study of the properties of the mutants indicated biochemical differences between wild types and mutants of C. perfringens. [11 references] [Abstracter: M. F. Tripple]

1.84 (Cross Reference: 1.0112)

devoted to shucking. The work goes on continuously except for landing catches and resetting the gear. Because this is not particularly easy or attractive work, some Atlantic coast fishermen have commented that many Alaskan fishermen may not find scallop fishing to their liking. The quality of the Alaska scallops is reported to be equal to the best taken on the east coast, and the Alaska scallops often measure 7 in. across. Balanced against this is the report that the east coast scallop product seems to be definitely less expensive than the Alaskan product. However, with a falling off in scallop production on the Atlantic coast, there are indications that some Atlantic scallopers will head westward if the Alaskan scallop fishery proves successful.

The Bureau of Commercial Fisheries has been studying scallops at various times since 1953. The Bureau uses an 8-foot scientific dredge whereas eastern scallopers use two 16-ft.-wide dredges. According to the Bureau, the dredges are towed right on the bottom. The smallness of the dredge mouth precludes taking many fish.

There are cost considerations in entering the new fishery. It is estimated that over $60,000 will be necessary to convert king-crab boats to scalloping. The minimum vessel length is 80 ft.; stout handling equipment and sheathed decks and hull sides are a must. The cost of building a new vessel for this type of fishing is estimated at $375,000 for a wood craft and $450,000 for a steel vessel.

The decline in abundance of the Alaska king crab makes the development of a scallop industry of great importance to Alaska fishermen. The scallop fishery offers a good possibility for profitable fishing, particularly if stocks prove to be plentiful and the price holds up.

2.01

made this culture the most active in monocarbonyl production. The culture of Streptococcus lactis was the only one of the group that caused a large increase in all three of the main monocarbonyl classes.

Group II--microorganisms that removed 2,4-dienals by completely destroying the 2,4-dienal class of the monocarbonyl fractions of rancid lard. Strong lipolytic and peroxide decomposing activity was shown by Pseudomonas fragi. Other members of this group were nonlipolytic and possessed a weak peroxide-destroying capacity. P. fragi also produced a large quantity of methyl ketones; it and A. flavus were the only two cultures of the 29 examined that produced this type of monocarbonyl.

Group III--microorganisms that removed both the 2,4-dienals and 2-ensls by completely decomposing them. Cultures of Staphylococcus aureus, Rhizopus oligosporus, and Geotrichum candidum were active lipase producers; the majority of organisms in this group possessed a strong capacity to decompose peroxides. Eight organisms produced a large increase in the alkanal content, which led to an increase in the total monocarbonyl concentration.

Group IV--microorganisms that caused decreases in at least two classes of monocarbonyls without completely destroying any class. This group was characterized by a relatively weak ability to alter the monocarbonyl content of rancid lard and weak ability to reduce the peroxide level.

A. flavus and P. fragi produced methyl ketones, a carbonyl class that does not appear in rancid lard. The ability to decompose hydroperoxides strongly appears to be related to the ability to produce a large increase in the monocarbonyl content. Apparently, however, the ability to decompose peroxides is not related to lipolytic activity. The importance of microorganisms in controlling hydroperoxides and monocarbonyls in fats is discussed.

EFFECT ON CLOSTRIDIUM STRAINS OF EUFLAVINE

2.1121 NORTH ATLANTIC TRAWL NETS

Bruce, Robert A. (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Gloucester, Massachusetts 01930)
Fishery Leaflet 600, 23 pp. (August 1967) (U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D.C. 20240)

Recent developments in the design of trawl nets have suggested that the fishing efficiency of the otter trawl can be improved. Papers describing various tests on new and traditional trawl nets have established certain facts about these nets and have elaborated on the problems associated with both relatively standard designs and with altered or new nets. Experiments with new and improved instruments have provided more information on nets and have suggested the possibility of further improvements in trawl design. Sometimes the results of these tests are contradictory or inconclusive, but total knowledge of net characteristics is increasing, and the belief persists that trawls can be made more efficient if the net and its gear are modified.

One of the results of these various activities has been the experimental trial and actual use of trawls that differ from the "typical" otter trawl. The different nets are called "new" because they differ in some respects from what is commonly being used; however, many of these so-called innovations are not new.. Two of the more frequently discussed types of new nets are the wing trawl

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 ABSTRACTER: M. F. Tripple

2.1121 ARE UNIVERSAL TRAWLS EFFECTIVE?

Jurkovich, Jerry E. (U.S. Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Seattle, Washington)
World Fishing 17, No. 6, 48-51 (June 1968)

The BCF (Bureau of Commercial Fisheries) Exploratory Fishing and Gear Research Base in Seattle, Washington, has been experimenting with a new trawl to determine if it can be used to fish effectively both in midwater and on the bottom. The BCF Universal Mk. II trawl represents a combination bottom and midwater trawl intended to replace the 400-mesh Eastern trawl that has been the mainstay of the local fleet for many years.

The headrope and footrope of the Mk. II are both 94 feet. The entire trawl is constructed of polyethylene webbing. The wing and forward body panels are made of 5-inch mesh; the after-body panels, intermediates, and cod end are made of 3½ in. webbing; the top and sides are made of No. 21 nylon, and the belly and wings of No. 36 nylon. The intermediate panels are composed of three pieces, each 120 meshes long and 60 meshes deep, constructed of 3½-in. mesh No. 60 nylon. The cod end is 110 meshes long and 60 meshes deep, constructed of 3½-in. mesh No. 84 twine.

The headrope and footrope are hung with 5/8-in.-diameter spliceable braided Dacron rope. The rope was soaked in water for 24 hours to ensure maximum stability and to eliminate incremental "hang-in." One ribline is hung along the

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 ABSTRACTER: M. F. Tripple

2.1125 (*) FAST-SINKING TUNA PURSE SEINE BEING TESTED OFF CALIFORNIA

Anonymous
Fishing News International 7, No. 7, 21 (July 1968)

Purse seines are used by fishermen to catch fish that range from small anchovies and sprats to large bluefin and yellowfin tuna. In the United States, more than one million metric tons of fish worth over $75 million are caught annually with purse seines. Despite the growing importance of purse seining, researchers have made few attempts to improve the catch efficiency of the net. About 50 percent of the purse seine sets for tuna are unsuccessful because fish escape during the setting and pursing operations. The proportion of unsuccessful sets increases with the depth and nature of the thermocline. If tuna purse seines could be made to sink fast and fish deeper, it is theorized that efficiency would improve. It is estimated that a 10-percent improvement in the rate of successful sets would reduce operating costs for the U.S. tuna fleet by more than $1 million a year.

A comparative study of the design and performance of various purse seine nets in which several scaled-down models were built and tested was undertaken by the BCF (Bureau of Commercial Fisheries). Evaluation of the data showed that the best net for fishing tuna should combine the fast-sinking qualities of the North Atlantic purse seine with the strength, deep fishing, and ease of handling of the American tuna seine. A model purse seine net incorporating the desirable design elements was built and tested. Results of tests with the model were so successful

*Item on back of card. (over)

 ABSTRACTER: M. F. Tripple

2.113 (*) THE OLD AND NEW CATHODIC PROTECTION FOR OFFSHORE STRUCTURES

Doremus, G. L., and J. C. Davis
European Shipbuilding 16, No. 3, 53-66 (1967)
World Fisheries Abstracts 19, No. 1, 3-4 (January-March 1968)

In the search for mineral wealth underseas, several million pounds of galvanic anodes and tens of thousands of d.c. amperes, impressed through a variety of quasi-inert anode materials, have been used to combat corrosion of steel by sea water. The authors describe the main types of each class of these anodes and discuss their various features. Tables and graphs summarize most of the data.

Galvanic anodes.--Zinc has a long history as a galvanic anode material, for it has a well established, frequently verified current efficiency, and it is a dependable performer when used properly. Zinc anodes used for marine cathodic protection are alloyed and cast to composition melting MIL-1800IG.

Magnesium has a higher driving potential and a lower density than zinc; thus, for the same total protective current output, fewer anodes and much less weight are required with magnesium. The higher potential, however, mitigates against long life. If the steel surfaces are prepolarized with a short-lived magnesium ribbon, the current density can be reduced, and, correspondingly, the number of heavy anodes that are installed can be limited. The magnesium ribbon treatment is, of course, not repeated unless the cathodic protection system is operated without attention well beyond the 2-year life span of the anode.

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 ABSTRACTER: L. Baldwin

NORTH ATLANTIC TRAWL NETS

COMBINATION BOTTOM AND MIDWATER TRAWL

FAST SINKING TUNA PURSE SEINE

CATHODIC PROTECTION FOR MARINE STRUCTURES

2.1121

center of each side panel, starting at the center wingtip and ending just before the splitting rings in the cod end. A ½-in.-diameter, galvanized 6 x 19 wire rope is hung to the footrope. The wire rope has a thimble spliced in each end that is served with 3/8 in. polypropylene rope. At each of the wingtips on the footrope, 145 lb. of chain is hung. A total of 67 8-in.-diameter aluminum trawl floats are spaced at 12-in. intervals over the wingtips and equally spaced along the headrope.

Preliminary tests with the Universal Mk. II produced satisfactory results. The mesh shapes approached the optimum, which is described as the fore and aft length being twice the lateral width to form 30° to 60° diamonds. The vertical height of the net was 21 ft. at the wingtips. The vertical height of the net was 34 ft. from the center footrope to center headrope in midwater, and 28 ft. when on the bottom. The horizontal width corrected to the fishing depth was measured at 51 ft. These measurements are impressive when one considers that the calculated maximum vertical height was 24 ft. and the maximum width 54 ft.

The Universal Mk. II caught significantly more roundfish but lesser amounts of flatfish than the 400-mesh Eastern trawl did. Lengths of chain were added when it was found the center footrope was off the bottom. Larger catches of sole were made after the chain was added. The chain did not affect the midwater configuration of the net. The tests showed that roundfish, as well as flatfish, could be caught by a trawl with a high vertical spread and without the overhang generally used in bottom trawls. On one occasion, the net was used as a midwater trawl and caught 5,000 lb. of roundfish when fishing an area considered too rough for conventional fishing gear.

2.113

A relative newcomer to the galvanic anode field is the magnesium jacketed zinc anode. Compared to the conventional zinc anode, it is 15 to 20 percent less in cost.

Aluminum should be the most attractive material of all for a long-life, galvanic anode--either in straight anode form or as a magnesium-clad aluminum type--for zinc at today's price levels cannot compete with the most elaborate aluminum anode made. As a result, different types of aluminum alloys are being tried.

Impressed direct-current anodes.--Graphite anodes occupy a strong position among the types of cathodic protection with impressed direct current. Anodes made of silicon-iron alloys, lead alloys, and platinum-tantalum have also given excellent results. [41 references]

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2.115 ON THE ICING OF SHIPS AND ITS EFFECT ON STABILITY

Nemoto, T.
Journal of the Nautical Society of Japan 26, 87 (December 1961)
World Fisheries Abstracts 17, No. 3, 3 (July-September 1966)

Many fishing vessels are lost during winter voyages in the North Pacific. The results are given of investigations into the effects of air temperature, sea temperature, and wind force on the accretion of ice at sea, and the effects of ice accretion on the stability of patrol boats and a fishing vessel.

[Extractor: L. Baldwin]

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2.1121

and the box or 4-seam trawl; yet wing trawls have been used successfully in Scandinavian fisheries for over 50 years, and a box trawl was patented in England over 40 years ago.

Increased trawl and gear research, comparative fishing tests between the standard and new nets, and economic expediency have led an increasing number of fishing vessel operators to try different trawl nets. New England trawl fishermen have recently experimented with standard trawls, new trawls, and new materials. Efforts to improve the New England otter trawls include altering the wings, changing the length ratios of headrope and footrope, experimenting with reducing lower-wing damage, and changing the lengths of legs and ground cables.

The purpose of this leaflet is to provide information on the otter trawls currently used in the North Atlantic fisheries. Although the major emphasis is on trawls used on New England trawlers, the leaflet also includes some of the trawls used by other countries fishing the grounds of the northwest Atlantic. This leaflet illustrates some of the typical nets used by American, Canadian, and European fishermen in groundfishing. For most of the nets illustrated, details of rigging on the 2-seam trawls are restricted to the wing and mouth areas because of the similarity in rigging such parts as the bellies and cod ends of all 2-seam trawl nets. More detail is given on the differences in rigging of the 4-seam or box trawl and the Polish factory stern trawl. Data such as overall size, twines, mesh sizes, rope and wire size, roller and chain gear, flotation, rigging, and certain details of construction accompany the drawing and text for each net. The designs cover trawls for vessels ranging from 55 feet (with 220-hp. engines) to 250 feet (with 2,400-hp. engines).

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that a full-scale net, 460 fathoms by 55 fathoms, was built. Sea trials will be held as soon as a vessel is available. The trials will consist of 2 or 3 days of routine net handling, including setting, hauling, and stacking, to determine what special handling techniques must be devised or net modifications made. Bathykymograph data on net depth and sinking rate will be collected at the same time.

If the net performs as promised and is accepted by the California purse seine fleet, the BCF predicts that tuna fishermen will have more efficient gear--it will retain the desirable features of the purse seine now used in the tuna fishery of the eastern tropical Pacific, and it will sink faster and use webbing with greater economy.

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1127 (Cross Reference: 1.0151)

PRELIMINARY EXPERIMENTS TO EVALUATE THE RELATIVE EFFICIENCY OF DIFFERENT NATURAL BAITS IN LINE FISHING

Balasubramanyan, R.
Fishery Technology 1, No. 1, 80-84 (1964)
World Fisheries Abstracts 17, No. 1, 21-22 (January-March 1966)

Because baits play such an important part in all line-fishing operations, the relative effectiveness of five different natural baits was compared. The results show that, in the experiments conducted by the author, live prawns and squids are superior to other baits. A large number of carangid fishes showed a striking preference for live prawn baits. The catch data for each type of bait tested are analyzed in detail and presented in tables. [Extractor: L. Baldwin]

EFFECT OF ICE ON VESSEL STABILITY

EFFICIENCY OF NATURAL BAITS IN LINE FISHING

2.115 A NEW WAY TO KEEP SHIPS STEADY

(*)
Anonymous
New Scientist 37, No. 590, 676 (March 28, 1968)

The vertical flight and hovering advantages of helicopters have been combined with the fast, forward flight advantages of conventional aircraft in a circulation-controlled rotor. The rotor uses what amounts to a gas pipe, which can be circular or elliptic in cross section. Lift is produced by a form of boundary layer control. The pipe has lengthwise slots cut into its upper surface, and blowing air through these slots produces extremely high lift, such as 13,000 pounds of lift from a rotor 12 feet in diameter. An advantage is that the rotor needs no complicated hinging gear.

Circulation control also works in water. If a circular cylinder in a water flow has similar slots and water is pumped through them, lift is generated in exactly the same way as with the rotor. Pumping water through another set of slots on the lower surface of the cylinder produces lift in the opposite direction. Thus, switching the water flow from one set to the other would produce positive or negative lift.

The circulation cylinders could be used to control the roll of ships. Cylinders could be housed in the hull of a ship and, when necessary, they could be wound out to project at right angles. Pumping water through the cylinders would

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 ABSTRACTER: M. F. Tripple

2.115 FISHING VESSEL STABILIZERS

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Brady, Peter
Fishing News International 7, No. 2, 30-32 (February 1967)

Throughout the fishing operation, the roll of the vessel decreases its efficiency. Therefore, a decrease in the effect of wave form on the behavior of a fishing vessel is desirable. Technological advances in design and construction of vessels have progressed rapidly in recent years, and there has also been increased research into some form of stabilization suitable for fishing vessels. The bilge keel damps the rolling action caused by waves; however, it has never been considered the ideal solution.

Certain types of fishing have shown the need for some form of stabilization to supplement the bilge keel. This need is most noticeable in the purse seiner, which cannot operate if the wind force is greater than 3 or 4. The vessel may drift into the net and become fouled or the strain created between the vessel and the net may become too great and the net lost or the vessel capsize. The solution is to decrease the strain by limiting the movement of the ship. A stern trawler can shoot and haul in worse weather than the purse seiner can, but the effectiveness of the trawl is lost as the vessel rolls in a wind of force 8. The trawl loses its normal pattern of operation and drops in catching efficiency in sea conditions caused by winds higher than force 6. The only practical way to improve the efficiency of the trawl is to reduce the action of waves on the

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 ABSTRACTER: M. F. Tripple

2.116 DETECTION OF FISH SCHOOLS BY SONAR (EASTERN TROPICAL PACIFIC, JULY-NOVEMBER 1967)

McClendon, Robert I. (Bureau of Commercial Fisheries Oceanography Center, La Jolla, California)
Commercial Fisheries Review 30, No. 4, 26-29 (April 1968) (Separate No. 811)

A Bureau of Commercial Fisheries (BCF)-coordinated investigation of the physical and biological oceanography of the eastern tropical Pacific was begun in 1967. The intent of the program is to provide the necessary data for more effective use of marine resources of the area, especially tropical tunas. The area from 20° N. to 20° S. and from the coast of South America to 126° W. is being covered by survey cruises using four to five vessels. Single vessels are making bimonthly monitoring cruises from 20° N. to 20° S. and from 98° W. to 119° W. This report concerns the occurrence of fish schools as determined from sonar data collected aboard the BCF research vessel on two monitoring cruises.

A target is defined as any object in the open sea that appears on the sonar recorder. The number of targets encountered on each cruise may be used as a measure of productivity and fish population in the area covered. The presence of echoes was used as an indication of fish schools. All targets included in this study were assumed to be fish. The number of targets in 6-hour periods are shown on track charts for the two cruises, and the number are estimates of total population along the track lines. The targets recorded for daylight hours were

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 ABSTRACTER: M. F. Tripple

2.117 WORLD INTEREST IN NEW GRP SECTION-BUILT VESSELS

(*)
Anonymous
World Fishing 17, No. 4, 25 (April 1968)

An English firm has developed a molding technique that allows construction of glass-reinforced plastic (GRP) vessels in the range of from 45 to 60 feet without the necessity of producing a new mold for each size. As a result of this development, the cost of a vessel is reduced, and craft within the 45- to 60-ft. range can be offered in varying stages of completion. The method of construction involves molding the hull in sections. By varying the size of some of the sections, both length and beam can be varied. The vessels are offered in the following stages of completion: (1) hull only; (2) hull with bulkheads, engine bearers, and tanks; (3) as in stage 2, plus decks; (4) as in stage 2, plus decks and superstructure; and (5) fully fitted out to the customer's specifications.

Hulls and decks are constructed of glass-reinforced plastic to Lloyd's "A" classification with wooden decking inset in working spaces. The superstructure is constructed to the same classification and is fully insulated. Accommodation in the forecastle may be for four to six crewmen, depending on the size of the vessel. The fish room can be refrigerated, insulated only, or containerized for easy discharge of the catch. The cubic size of the fish room varies according to the size of the vessel, but the capacity would be between 4,000 and 7,500 cubic feet. Although the general arrangement is representative of the stern

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 ABSTRACTER: M. F. Tripple

NEW WAY TO KEEP SHIPS STEADY

STABILIZERS FOR FISHING VESSELS

DETECTING FISH SCHOOLS WITH SONAR

GLASS-REINFORCED PLASTIC CONSTRUCTION OF BOATS

2.115

vessel. The long liner also had problems fishing in a swell. Rolling of the ship puts undue strain on the lines and makes getting the fish aboard difficult. There is also the human aspect and the effect of ship roll on the efficiency of the crew. Human labor accounts for between 30 and 40 percent of the gross earnings of a fishing vessel. Even with mechanization and automation there are still many arduous tasks to be performed. With bad weather and rolling, the crewman expends much of his energy in bracing himself against roll; therefore, his efficiency is obviously reduced.

The fishing vessel requires a stabilization system that is in operation continually whether the vessel is in motion or is stopped. Two systems have been adopted; both involve the transfer of a liquid from one tank to another. One system is activated by mechanical means; it is the more costly and has not shown any advantages. The other system, a passive one operated by gravity and ship roll, has proved successful. Norway has adopted the system in her commercial fishing fleet.

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2.116 (Cross Reference: 2.1476)

GREAT LAKES GILL NETS

Gordon, William G. (Bureau of Commercial Fisheries Exploratory Fishing base, Ann Arbor, Michigan 48103)
Fishery Leaflet 606, 8 pp. (June 1968) (U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington D.C. 20240)

This report on the present methods of setting and retrieving gill nets in the Great Lakes has illustrations of equipment, techniques, and materials commonly used throughout the Great Lakes fishing industry. [Abstracter: M. F. Tripple

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2.115 DESIGN OF THE FISHERY RESEARCH VESSEL OREGON II

Captiva, Francis J. (Bureau of Commercial Fisheries, Exploratory Fishing and Gear Research Base, Pascagoula, Mississippi 39567)
Circular 256, 27 pp. (April 1968) (U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D. C. 20240)

This report describes the Bureau of Commercial Fisheries' research vessel Oregon II, which was designed for exploratory fishing and gear development studies in the tropical and subtropical portions of the western Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. The vessel will be 170 feet long, will have a mean draft of 12½ feet, and a beam of 34 feet. It will be propelled by two 800-horsepower diesel engines connected to a single controllable-pitch propeller. The vessel incorporates many innovations for ease, safety, and flexibility in gear handling. [Abstracter: M. F. Tripple]

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2.117 HOW LAKE SUPERIOR GILL NET VESSEL WAS CONVERTED TO TRAWLER

Handwork, Warren (Bureau of Commercial Fisheries, Exploratory Fishing and Gear Research Base, Ann Arbor, Michigan)
Commercial Fisheries Review 30, No. 4, 30-35 (April 1968) (Separate No. 812)

Smelt, chubs, and alewife are caught in Lakes Michigan and Erie by trawling. The vessels being used are mostly converted gill-net vessels. Experimental trawling was one part of a program by the Bureau of Commercial Fisheries to help the commercial fishing industry of Lake Superior. Under this project, two gill-net vessels were modified into trawlers to determine the feasibility of trawling for smelt, small chubs, and other underutilized species. This article reports on the conversion of a 45-foot, steel, gill-net vessel. Included in the report are descriptions of the deck equipment and its arrangement, electronic equipment, trawl nets and doors, and conversion costs. [Abstracter: M. F. Tripple]

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estimated from running time and are expressed as targets per mile. The number of targets recorded for nighttime was adjusted for the day-night difference.

Because the sonar used was designed for research, it was more versatile, more powerful, and had a greater range than sonar units on most fishing vessels. Only the information from the 11-kiloHertz (kHz) set was used in this study. The 11-kHz transducer was aimed 10° off the starboard bow and set at a range of 2,500 meters. The sonar beam of about 23° covered a horizontal band about ½ nautical mile wide. The ship moved through the water at an average speed of 10 knots, so an area of about 5 square miles was searched each hour, and an area of 75-85 sq. mi. was sampled in a day's running.

Consistently more contacts were recorded during daytime than during darkness. There was a trend toward more targets in the first half of the daylight interval. A difference in number of targets between nighttime intervals seems to be completely random. The author assumes that the diminished number of schools during night hours indicates a diurnal change in the depth at which the schools are likely to be found. The difference in times that different species appear at the surface during the day suggests that they may be at different depths during the night.

The study showed the usefulness of sonar in estimating total population over a wide area in a short time. Depending on surface sightings alone to estimate fish population would have resulted in a different distribution and a different total number of schools. If the 100:1 difference between sonar recordings and surface sightings of fish schools is considered, the value of sonar in direct support of fishing is seen.

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2.115

have the same effect as actuating the airfoil section stabilizers now fitted to some ships. The cylinders would not need the retracting machinery of the airfoil stabilizers, and this would save valuable space. Spacing a number of cylinders along the side of the ship would give control of pitch in some sea conditions. The cylinders would be about 3 feet long and 6 inches in diameter for the best performance. Rotating the cylinders so that they were at an angle of 45 degrees to the side of the ship would give control of yaw. Use of the circular cylinders might make it possible to control ships in three dimensions.

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2.119 US [U.S.A.] FIRM TO MAKE SURVIVAL CAPSULE FOR FISHERMEN

Burgess, John
Fishing News No. 2873, 7 (June 28, 1968)

Glass-reinforced plastic capsules designed to increase chances of survival from wrecked oil rigs and ships are being manufactured by a California firm. The capsule is lenticular in shape and is 14 feet in diameter. It is constructed of a fire-retardant fiberglass, which is impregnated with a radar reflective material, A sprinkler system wets the outer shell when oil fires are encountered, and the inside air is purified and recirculated to keep the occupants cool and in no danger of suffocation. There is a steel center column for added strength.

A stabilizer and a free-floating ballast system make the capsule seaworthy. With 28 people aboard, it has a self-righting ability of up to 125 degrees of inclination. Even if the capsule is swamped, it cannot sink. There is an outside flange for exercise by a normal complement, or as standing room for an additional 25 persons in an emergency.

The hull is capable of withstanding tremendous impacts, including collision with ice, hulls, metal stanchions, and falling debris. Tests have shown that the hull can withstand an explosive force of 10 tons at 35 feet.

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 ABSTRACTER: M. F. Tripple

2.119 SAFETY FOR THE COMMERCIAL FISHING VESSEL AND CREW

Murray, John J. (Bureau of Commercial Fisheries, Gloucester, Massachusetts)
Commercial Fisheries Review 30, No. 6, 46-52 (June 1968) (Separate No. 818)

Marine insurance has always been expensive, and the cost will probably remain high. The costs of insurance premiums to most fishing-vessel owners are the third largest operating item, after wages and fuel. Increasing settlements for claims resulting from personal injury and death have produced corresponding increases in costs of protection and liability coverage. The cost of insurance is susceptible to direct control through a safety program that will detect and correct unsafe conditions and practices.

In 1959, the BCF (Bureau of Commercial Fisheries) began a Fishing Vessel Safety Program for the New England fishing fleet to reduce the accident-frequency rate of crews and to reduce the cost of marine insurance premiums to vessel operators. The Safety Unit of BCF strongly urged adoption of the following measures to reduce accidents resulting from falls.

1. Install skid-resistant bridge flooring on deck, winch platform, companionway ladders, and engineroom floors.
2. Provide and rig life lines stretching from forecastle to breakdeck for use during heavy weather.
3. Install protective guard rails around deck bollards and in front of trawl winches.

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 ABSTRACTER: M. F. Tripple

2.143 ELECTROFISHING

Hooker, C. (State Fisheries Department, New South Wales, Australia)
Commercial Fishing 7, No. 1, 5-7, 9, 11 (January 1968)

Electric currents passed through water will frighten, direct, stun, or kill fish. A direct current (d.c.) unit that added a pulsation to the current gives the best results. With the proper number of pulses, fish can be attracted from inaccessible habitats and led into a net. A pulsating d.c. does not injure fish as much as alternating current does. If fish are properly exposed to a pulsating current, recovery is almost instantaneous. Electrofishing is the most suitable method known for capturing fish that are hard to net or spiny fish that are badly damaged by netting. The properties of electric currents are of value to fisheries biologists, conservationists, and fishermen.

Fish-shocking devices are being used in worldwide ocean fisheries. Trawlers use electricity in the footropes to tickle prawns off the bottom and prevent fish escaping the net. The Russians stun large schools of fish with electric shock to prevent injury and scale loss when the fish pass through large suction pumps onto the processing decks. The French use electricity to shock sardines before brailing them from the net into the boat. Tuna longlines have been attached to a shocker that is actuated by the struggles of the hooked fish. The struggle elicits an electric shock that stuns the tuna and reduces the movements that attract predators. The idea of using pulsed d.c. to shock whales has proved quite successful, and electrical whaling from helicopters has been considered by England and Germany.

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 ABSTRACTER: M. F. Tripple

2.144 LAMP FISHING TRIAL WITH A HERRING PURSE SEINE

Gauthier, Monique (Marine Biological Station, Grande Rivière, Quebec, Canada)
World Fishing 17, No. 4, 32-33 (April 1968)

The use of light to attract fish is widely practiced. Fishermen in the Eastern Atlantic favor electric lamps, which give a steady and very white light. The waters of the Gulf of St. Lawrence, where the trials described in this report took place, resemble those of the Eastern Atlantic in that light cannot readily penetrate the dark water and thus must be more powerful.

The light source used for the trials consisted of two independent 500-watt lamps with silvered glass backing and five 500-watt lamps mounted in an enameled reflector panel. The entire assembly was watertight and could be operated at 160-ft. depths. The sockets were filled with oil for insulation in deep water, and an improved system of water seals facilitated changing the lamps. The light sockets were coated with epoxy resin to resist corrosion. The generator was a 5,000-watt, 120-volt a.c., 60-cycle set with a separate transformer to reduce voltage to 28/32 volts and provision for adjusting voltage and light intensity from full-on down to one-quarter. The electrical equipment was installed on a 40-foot motor boat, which worked in collaboration with commercial herring purse seiners. The purse seiners were equipped with echo sounders and sonar and had power blocks.

As soon as a shoal of fish was located, the seiner would extinguish its deck lights and call the light boat, which would anchor over the shoal and switch on

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 ABSTRACTER: M. F. Tripple

SURVIVAL CAPSULE FOR FISHERMEN

SAFETY FOR FISHING VESSEL AND CREW

APPLICATIONS OF ELECTROFISHING

LAMP FISHING WITH A PURSE SEINE

2.119

4. Prevent oil and fuel leaks on deck.

5. Provide ladders for boarding and debarking from moored vessels.

The best results were noted with the installation of skid-resistant material on decks, now a common practice on most small- and medium-sized vessels.

In 1961, BCF initiated a series of vessel safety bulletins that point out the hazards and potential accident sources and recommend corrective measures. Another phase of the work was dockside demonstrations of approved marine safety equipment. The BCF also worked closely with the U.S. Department of Labor in planning, instructing, and successfully completing 12 on-the-job training courses for fishermen. On-the-job safety was stressed in all the courses.

The problem of safety is not simple. The following are some fundamental measures that should be considered. (1) Form industry advisory groups in all major fishing areas that would include fishermen, vessel owners, and insurers. The groups should advise industry and Federal agencies on the safety of fishermen and the fleet. (2) Establish standards for lifeboats and dories used for lifesaving that would cover installation, certification, and inspection. Standards should also be established for launching equipment and provisions for semiannual launching drills. (4) Incorporate all newly constructed vessels with approved marine safety measures, such as nonskid decking, bollard guards, engineroom color coding, fire-detection and -alarm system, shutoff valve (located on deck) for main engine, metal covers over trawl wires leading from forward deck bollards to gallows base, dual bilge-pumping lines, and a self-contained water pump. (4) Equip selected vessels with emergency water pumps as standby equipment for transfer to distressed vessels at sea. (5) Cooperate with local fire departments to conduct annual fire prevention and fire protection survey of all vessels.

2.144

its lights to attract the fish. The depth of the lights depended on sea conditions, water depth, and amount of moonlight. When the attraction period was deemed completed, the light boat reduced the intensity of the lights to concentrate the shoal. The seine was then shot around the lamp boat, and the lamp boat worked toward the center of the net to keep the fish away from the gap in the net. When the net was pursed and the rings retrieved, the lamp boat would extinguish its lights and move away.

Tests were made with a photometer light-measuring device. Under the operating conditions, light intensity was reduced to one-tenth at 20 ft. from the lamps, and no light was detectable at 53 ft. below the lamps. The two independent lamps were suspended on either side and below the main cluster to extend the effective range. The positive attraction of herring to light was verified. Herring appeared within the lighted area as soon as the lamps entered the water. The herring were generally concentrated in a 300- to 450-ft. radius around the lamp boat and beneath the lamp cluster. The light also attracted other fish, mainly mackerel.

Certain recommendations are made as a result of these experiments. It is suggested that triangular wing pieces at each end of the seine would simplify recovery of the wing end when hauling begins with the power block. A longer seine would make maneuvering easier. The lamp gear should be improved and should consist of a hexagonal panel, with six lamps, wired as two independent groups of three. It is also desirable to have an echo sounder transducer on the panel to give a positive report of fish density to the seiner skipper.

2.119

The capsule reduces the hazards of most survival systems because it has a self-heating system, which prevents ice formation and maintains warmth for survivors, a radio telephone, toilet, and food to feed 28 people for 5 days.

In the ready-to-launch position, the capsule is secured so that the upper half is at deck level. The two, large, watertight doors are closed by twisting a lever. Passengers fasten themselves in with seat belts for the launch, which can be controlled at a rate varying from 1 to 10 feet per second. The launching mechanism is controlled from inside the capsule, and no external power or assistance on deck is needed. The capsule can be launched from heights of 150 feet.

Once in the water, the capsule can be maneuvered at speeds of up to 3½ knots with minimum response to wave action. It is fitted with an inboard four-cylinder diesel engine that can be started hydraulically. An alternator is fitted for rapid recharging of the battery. Enough fuel is carried for 5 hours of running time.

The company intends to produce larger 35-man capsules for use on passenger lines and smaller 8-man units for use on cargo and fishing vessels. Representatives of the company consider the 8-man capsule to be of particular value to fishing fleets because of the speed at which it can be entered, the self-releasing gear, and the ability to withstand suction from a sinking ship. The company considers the capsules the best lifesaving devices for the rugged conditions encountered on fishing grounds. At the present time, neither the U.S. Coast Guard nor the British Board of Trade regulations cover the use of a lifesaving device so advanced.

2.143

Electricity can be used in many ways to repel fish. Arranging electrodes around the intakes of water pumps and hydroelectric penstocks will repel fish. Movements of fish can be controlled by electric barriers; this practice is useful in guiding the fish needed for hatchery purposes.

Electric chains laid on the bottom across river mouths have halted the influx of undesirable species into the rivers. Electrical barriers have been used in the United States to prevent sea lampreys from going upstream to reach their spawning grounds. Electric barriers are also used to divert desirable fish around the lamprey barriers.

The State Fisheries of New South Wales, Australia, tested two electric shockers in various applications, and the results are reported in this article. The smaller, backpack unit was powered by a 12-volt battery. It gave 150 watts of power at 250 volts, the d.c. could be pulsed from 0 to 75 impulses per second, and there were three settings for waters of different conductivity. The larger shocker was powered by a 3-kilowatt gas generator and had a large impulse transmitter and a rectifier. Both shockers were tested under diverse conditions, and the advantages and disadvantages were noted. It is the author's opinion that the present equipment can be improved. The voltage can be increased for better results in waters of high resistance. The wave form of pulsed d.c. can be altered for more efficient operation. Electronic triggering devices will give better control of low pulse rates and many more impulses per second.

2.15 (*) FULL-SCALE TESTS HAVE SHOWN ADVANTAGES TO BRITISH TRAWLERS OF BOXING AT SEA

Brady, Peter
Fishing News No. 2872, pp. 6-7 (June 21, 1968)

Following trials on large-scale commercial application of boxing at sea, the WFA (White Fish Authority) reached the following conclusions from the experience gained: (1) if trawlers had been boxing fish at sea as a normal practice, they would have been no worse off and possibly even better off at that time; (2) the merchants would probably have been better off in several ways, despite the small risks attached to the weight and grading of fish; (3) provided that no extra crew was required, the trawler owner would have been no worse off and probably better off; and (4) the consumer would benefit in that there would be less poor-quality fish on the market.

From a survey of the present scheme of boxing fish at sea and its progress over the past year, the author feels that it would be safe to say that boxing at sea has produced some definite advantages, which he sums up as follows. (1) Boxed fish is usually of better quality than fish shelved or stowed in bulk, therefore, boxed fish sells better and usually commands a better price. This gives added benefit to the vessel owner and crew. Many merchants say they benefit by increased fillet yield. (2) The entire operation, from fishroom conversion to washing of the boxes, is relatively simple. There are few problems once

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*Item on back of card.

 ABSTRACTER: M. F. Tripple

2.15 SUPERCHILLING FISH ABOARD TRAWLERS

Waterman, J. J., and D. H. Taylor
Torry Advisory Note No. 32 (Torry Research Station, P.O. Box 31, 135 Abbey Road, Aberdeen AB9 8DG, Scotland)
Canadian Fisherman 55, No. 5, 24-26, 31 (May 1968)

This article explains superchilling of fish and describes how the technique can be used to increase the storage life of iced white fish on board ship. The advantages and disadvantages of superchilling are discussed and compared with those of conventional chilled stowage of fish in ice.

Superchilling means reducing the temperature of fish uniformly to 28° F., which is somewhat below the temperature of fish kept in melting ice. At about 28° F., half the water in the fish is frozen and bacterial action is slowed. A temperature of 28° F. is recommended because the number of large ice crystals formed is not critical, whereas at 27° F. the water freezes slower, the ice crystals are larger, and the damage to the fish is greater. Very close control of superchilling temperature is essential.

Fish in crushed ice remains edible for about 15 days; fish superchilled to 28° F. remains edible for about 26 days. At a temperature not lower than 28° F., storage time can be extended as much as 11 days under ideal conditions and at least 6 days in commercial practice. Superchilled cod normally show an improvement in keeping over chilled cod only after about 12 days. Superchilling,

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 ABSTRACTER: M. F. Tripple

2.15 (*) MATERIAL HANDLING ON WEST COAST TRAWLERS AND SEINERS

Allen, Robert F. (Marine Construction and Design Company, Seattle, Washington)
Western Fisheries 75, No. 2, 16-17, 76-82, 84 (November 1967)

Negotiations within the fishing industry usually determine the apportionment of gross income between vessel and crew. The variable operating costs such as fuel, ice, and gear maintenance comprise only a small part of the total cost. Thus, owners of fishing vessels depend upon increasing the gross stock as the most effective means of increasing their earnings. Increasing the gross stock can be accomplished (1) by increasing the annual catch of the vessel or (2) by maintaining the same catch while increasing the value of the landed product through better preservation or refined processing on board. Where the owner of the vessel is also the captain and shares in the crew's income, reducing the size of the crew means he will receive a large percentage of the total crew share. The crewmen are also better paid, which affects productivity because vessels with higher wages attract the more skilled fishermen. Considering the differences in catches made by similar vessels on the same grounds, it is apparent that the skill of the fishermen has an effect on success.

Any fishing vessel that operates with more than a minimum crew while only steaming is subject to a reappraisal of the entire cycle of fishing operations to determine the critical phase that requires full utilization of manpower. When the critical phase is eliminated or mechanized, the result will be a reduction

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 ABSTRACTER: M. F. Tripple

2.15 THE HANDLING OF CAPE HAKE

Burt, J. R. (Torry Research Station, Aberdeen, Scotland), G. M. Dreosti (The Fishing Industry Research Institute, Cape Town, South Africa), N. R. Jones, J. H. Kelman, I. McDonald, J. Murray, C. K. Simmonds, and G. D. Stroud
Fishing News International 7, No. 6, 39-40, 42 (June 1968)

The Fishing Industry Research Institute in Cape Town, South Africa, and the Torry Research Station in Aberdeen, Scotland, cooperated in an investigation of the processing technology of the Cape hake (Merluccius capensis). The experiments were grouped under three main headings: (1) freezing ashore after chilled storage at sea, (2) freezing ashore after treatment with dips, and (3) freezing at sea. Attention was focused on color and breakup of the flesh; flavor and eating texture were also assessed.

The major portion of the South African catch of hake is frozen ashore after chill storage at sea in ice or in RSW (refrigerated sea water). The effects of delay before gutting, of time and temperature before chilling, of boxing at sea, of time in chill storage, and of time and temperature of frozen storage on different types of products were investigated. The results obtained were generally as had been expected. Discoloration in fillets increased when the fish were held ungutted for increasing lengths of time, although acceptable colors were obtained when the gutting was delayed for 3 or 4 days.

(over)

 ABSTRACTER: M. F. Tripple

2.15

in crew. The high competing wage for land jobs and the low competitive price of fish have forced fishermen to find solutions to these problems. It is not surprising that many of the technological advances in fishing methods, which are now recognized worldwide, were first applied in the Northwest. These advancements include such methods as purse seining with the Puretic power block, drum seining, high-speed crab-pot hauling, and drum trawling. The author attributes all of these inventions to the fishermen, not to naval architects or gear manufacturers.

The designer who focuses his attention on refining the hull shape, propulsive efficiency, trim and stability of the fishing vessel is overlooking the real problems that have a greater effect on the commercial success of a fishing vessel. The author hopes that a study of material handling by various fishing methods and various fisheries will indicate the critical phases where the naval architect can apply his talents toward developing solutions. This study of material-handling problems is a study of fishing methods as they apply to the speed of gear and fish handling, and to the manning requirements of the vessel. The fisheries under consideration in this paper are those of the West Coast of North America, where the techniques of trawling and purse seining are used. The author presents a comprehensive study of gear handling, fish loading and unloading, stowage, refrigeration, and processing on board.

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2.41 IMPROVING AND EXPANDING THE DISTRIBUTION OF FRESH (UNFROZEN) SEAFOODS BY MEANS OF INSULATED CONTAINERS

Anonymous

Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Massachusetts; Commercial Fisheries Review 30, No. 4, 39-42 (March 1968) (Separate No. 808)

2.15 (Cross Reference: 1.53)

The necessity at high ambient temperatures of avoiding delays before freezing was confirmed, particularly in respect to breakup. Breakup is even increased by extended delays at chill temperatures. Ratings of color and breakup were poorer as a result of freezing and thawing and extended cold storage. Fish chill-stored in RSW gave the impression of having firmer flesh than iced fish, both before freezing and after thawing. The extent of breakup was similar in both fish. Samples dipped in brine, TPP (sodium tripolyphosphate), or both had better color, were less broken, had better texture, had more acceptable flavor, and dripped less when thawed than untreated samples did. The presence of salt in the flesh made the flesh firmer than did TPP alone. Significant differences were seen, depending on whether the fish were whole and gutted or filleted when frozen at sea. If time was allowed for bleeding, fillets from whole hake frozen at sea had acceptable color, whereas few of the fillets frozen at sea had good color. Delays before freezing led to the breakup of fillets cut from the whole fish; fillets frozen at sea were superior.

As a result of the experimental findings, it has been stipulated that all delays are to be avoided when handling hake. The catch is to be chilled, as soon as it is brought below, by immersion in RSW, or with crushed ice. The hake is to be kept at chill temperatures until it is frozen. Adequate time must be allowed for bleeding. The handling of the catch is to be expedited at all times, particularly so for fillets frozen at sea where the problem of blood discoloration is acute. The general quality of the hake justifies these precautions. If good fish-handling practice is followed, an acceptable product is readily achievable.

2.15

experience is gained. Financial assistance is available from the WFA to assist in the cost of fishroom conversion. The control of boxes can easily be handled by a local box pool. The costs of hiring and cleaning boxes can be offset by reduced labor costs for discharge and handling. (3) No increase in crew members aboard ship has been found necessary. Crews have taken very well to the scheme. (4) The fish merchant has greater flexibility because the fish are already boxed on discharge from the vessel. There are some doubts about the size of the box, but the obvious effectiveness of the scheme seems to outweigh any reluctance to participate because of this. (5) Because a generally better product is put on the market, the consumer gets a supply of better quality fish. This is of paramount importance today if fish promotion schemes are to have the desired effect of increasing the consumption of fresh fish.

The commercial application of boxing a trawler's catch at sea can be regarded as quite feasible and perhaps even necessary if a viable and vigorous fresh fish trawler fleet is to be continued.

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2.15 PROCESS FOR IMPROVING THE KEEPING QUALITY OF FRESHLY CAUGHT SALT WATER FISH

French Patent 1,395,312

Chemical Abstracts 68, No. 23, 104109y (June 3, 1968)

2.15

therefore, is of most value in keeping the earliest caught fish on a fishing trip. It is assumed that superchilling will be more valuable on a fishing trip where the average catch rate is fairly modest. The same amount of ice is required for superchilled storage as for chilled storage, but additional refrigeration capacity is required to lower the temperature of the fish and ice to 28° F.

The most important advantage superchilling imparts is that a vessel can extend its voyage by a week and still land its fish in no worse condition than its conventional counterpart, or it can return in the normal length of time with the oldest part of the catch in better condition. Against this advantage must be balanced the drawbacks of the superchilling technique. Superchilling shows no advantage over ordinary icing until the cod have been stowed for about 12 days, and up to 10 days the quality may be inferior to that of ordinary chilled cod. This means the fishroom must be divided and equipped to provide both chilled and superchilled storage or the entire catch must be superchilled unnecessarily and perhaps undesirably. The most convenient way of applying superchilling is to use boxes, which means having two different methods of stowage on board. The biggest drawback to superchilling is the heavy initial cost for refrigeration plant, fans, ducting, structural alterations, and boxes. Once the system is in operation, the running cost is low. A practical stumbling block is the fact superchilled fish are partially frozen and cannot be handled immediately in the same manner as unfrozen fish. This will cause problems for the fish merchant. Also, maintaining accurate control of the superchilling process is a problem.

SHIPPING CONTAINER FOR FRESH FISH

INCREASING SHELF LIFE OF FRESH FISH (FR. PAT. 1,395,312)

3.12 POLYPHOSPHATE DIPS FOR FISH

Anonymous
Torry Advisory Note No. 31 (Torry Research Station, Aberdeen, Scotland)
Commercial Fishing 7, No. 1, 19-21 (January 1968)

A phosphate is a salt of phosphoric acid; a number of phosphate molecules linked together form a complex chemical structure known as a polyphosphate. The phosphate salts most often used in the fish-processing industry are those of sodium and potassium, such as sodium tripolyphosphate, sodium pyrophosphate, and potassium pyrophosphate. These polyphosphates are frequently used as additives in many fish products to aid processing and to improve appearance or eating quality.

The main value of polyphosphates in the fish industry is in reducing or preventing drip from the cut surfaces of the fish flesh, either during storage or during thawing. The manner in which a polyphosphate works is not completely understood; one theory is that it dissolves some of the protein near the cut surface and that this protein forms a thin layer to prevent the escape of fluid. Whatever the manner of operation, polyphosphates can improve the retention of moisture in protein foods during storage. They can also improve the presentation of wet fish for retail sale because white fish fillets dipped in a polyphosphate solution will release less fluid in a retail pack than undipped fillets will.

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ABSTRACTER: M. F. Tripple

3.2495 (*) CHANGES IN FISH PROTEINS CAUSED BY STORAGE IN SALINE SOLUTION AND THEIR INHIBITION BY PHOSPHATES. STUDY OF THE REACTION MECHANISM BY TRACER TECHNIQUE

Nikkilä, O. E., Taina Kuusi, and Riitta Kytokangas (The State Institute for Technical Research, Laboratory for Food Research and Technology, Otaniemi, Finland)
Journal of Food Science 32, No. 6, 686-690 (November-December 1967)

Linko et al. (1961) found that there was a rapid decrease in the solubility of actomyosin when fillets of Baltic herring were kept in sodium chloride solutions at a strength of 2 to 5 percent. This decrease could be prevented if the sodium chloride solutions also contained 1 to 3 percent of pyrophosphate. However, the mode of action of the pyrophosphate has not been determined. In the present study, the transfer of the pyrophosphate in herring fillets was investigated with solutions containing pyrophosphate, either alone or with sodium chloride. The speed of the migration was followed by autoradiography and by parallel counting of the radioactivity. The investigators were also concerned with the incorporation of the pyrophosphate into the different compounds of phosphorus separated by fractioning the fillets. A check was made of simultaneous changes in the solubility of actomyosin during the course of storage.

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ABSTRACTER: M. F. Tripple

3.2342 BRINE IMMERSION FREEZING IN FISHING BOATS

Lassen, Sven
Fishing News International 6, No. 12, 43-44, 47 (December 1967)

The technique of brine-immersion freezing has found a limited, but consistent, use in preserving tuna in transit from distant fishing grounds to shoreside processing plants. Although the brine-immersion freezing system has been in use for over 30 years, the author feels a reappraisal of the method would be useful.

Among the advantages of using brine-immersion freezing are that it requires a minimum of product handling, it has a low maintenance cost, it produces a good-quality frozen fish in large volume at rated capacity, and it requires a minimum of space because the fish are frozen, stored, and thawed in the same tank. Ideally, all freezing systems used on board fishing boats should be able to handle as large a quantity of fish as possible in unit time and to lower the temperature of the fish as rapidly as possible. The author believes that a modified brine-immersion freezing system offers possibilities in this respect.

When the brine-immersion freezing system is compared with cooling and freezing with air, the heat-transfer characteristics of liquid in contact with fish are superior to those of air in contact with fish. The rate of heat transfer between air and solid ranges from 0.2 to 8 B.t.u.'s per hour per square foot per degree Fahrenheit, whereas the rate of transfer between liquid and solid ranges from 50 to 300 B.t.u.'s. The higher, specific heat of brine as compared to that

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ABSTRACTER: M. F. Tripple

3.4 PROCESSING GREAT LAKES CHUB (LEUCICHTHYS HOYI)

Bratzler, L. J., and M. O. Robinson (Department of Food Science, Michigan State University, East Lansing)
Quarterly Bulletin 49, No. 4, 440-444 (May 1967) (Michigan Agricultural Experiment Station, Michigan State University, East Lansing)

Production of smoked chub (Leucichthys hoyi) has played an important role in the fish industry of the Great Lakes. Although production of chub for smoking in 1962-63 was about 11 million pounds, this tonnage has decreased in recent years because of reported outbreaks of botulism attributed to improperly processed and handled smoked chub. The Food and Drug Administration appointed a committee to study the problem and make recommendations, one of which was heating and holding the fish for 30 min. after the lowest internal fish temperature had reached 180° F. A regulation to this effect was adopted by three states. As this requirement was different from the traditional maximum internal temperature of about 140° F., the domestic smoked-fish industry expressed the opinion that an acceptable product could not be produced under these conditions. The objective of the research reported in this paper was to study the effect of various processing variables on smoked chub that were treated according to the new regulation to determine what processing conditions could be used by the industry to produce a satisfactory product.

A considerable amount of high-pressure steam was injected into the conditioning unit to maintain the wet bulb temperature of 110° F. for the first 60 min.,

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ABSTRACTER: M. F. Tripple

POLYPHOSPHATE FISH DIPS

BRINE-IMMERSION FREEZING OF TUNA

CHANGES IN FISH PROTEINS DURING STORAGE

PROCESSING SMOKED CHUBS

3.2342 (Cross Reference: 2.118)

of air also favors the use of brine. Liquid has about four times the capacity to carry away heat from a warm body as does the same weight of air. The high difference in specific volume between brine and air makes it easier, less bulky, and possibly cheaper to circulate a freezing medium such as brine.

The disadvantages of the brine-immersion freezing system are that it freezes the product slowly, it requires careful loading into the well and careful control of temperature, it is not versatile for freezing various fish or shellfish, it requires large amounts of salt for freezing and thawing, it requires a high-capacity refrigeration system and auxiliary power, and its slow rate often leads to excessive absorption of salt by the flesh.

To these disadvantages the author adds the following. There is the problem of surface oxidation when tuna are held for an extensive length of time in the wells before being unloaded. This problem could be reduced or eliminated by adding an antioxidant to the brine or by filling the interstices within the loaded well with an inert gas. Faulty application of the brine-immersion freezing system results in a distorted or warped appearance of the tuna. Overloading the wells causes both warped appearance and penetration of salt. Salt penetration indicates poorly conducted freezing or thawing. No satisfactory solution to this problem has been suggested.

The author concludes by citing evidence that fish of excellent quality can be obtained by brine freezing when the fish are rapidly frozen in a brine immersion freezer of special design and are stored separately in cold storage. [19 references]

3.4

115° F. for the third 30 min., and 165° F. for the fourth, fifth, and sixth 30 min. This practice aided in rapidly heating the fish and maintaining the smokehouse temperature. When no steam was injected, processing time was increased by 55 percent (to 4 hr. and 40 min.), total yields decreased by about 10 percent, and relative humidity ranged from 9 to 15 percent.

Processing and analytical data from two batches of chub

| Process variable: | Batch 1 | Batch 2 |
|---|---|---|
| Number of fish | 18 | 16 |
| Brine (salinometer reading) | 16° | 50° |
| Length of brining | 62 hr. | 16 hr. |
| Length of heating and smoking | 3 hr. | 3 hr. |
| Yield: | | |
| Processed yield (fresh basis) | 76.2% | 75.5% |
| Brine pickup | 14.1% | 5.1% |
| Water | 71.7% | 63.9% |
| Ether extract (dry basis) | 28.9% | 32.7% |
| Salt conc. in water phase | 3.2% | 5.3% |
| Protein | 16.8% | 20.2% |
| Phenols | 1.4 mg/100 g. | 1.5 mg/100 g. |

The fish were not wrinkled or unattractive; however, color may have been slightly darker than that obtained in previous commercial practice when internal fish temperatures did not exceed 140° F. Removing the scales improved external appearance. Smoke deposition, estimated by an analysis of phenols, correlated well with the taste panel's perception of smoke flavor. The panel's determination of acceptability gave scores of from 5.8 to 7.6 on a hedonic scale. Smoke aroma and flavor in the fish were noticeable but not excessive.

3.12

One point is repeatedly stressed--where freezing and cold-storage practices are good, there will be very little drip from fillets, even if they were not dipped; where the processing conditions are poor, fluid will be released from muscle whether or not the fillets were dipped. The only difference is that the fluid released in the dipped fillets will be retained within the flesh by the layer of protein on the surface, whereas the released fluid in the undipped fillet will drain away when the fish is thawed. Therefore, polyphosphate treatment will reduce weight loss from badly stored frozen fish, but it will have little effect on good-quality fish.

Polyphosphate dips are also used in preparing blocks of frozen fish muscle. A preliminary dip facilitates the production of a dense, uniform block when pieces of skinned white fish are being put into molds for freezing. The polyphosphate acts partly as a lubricant when the block is being packed and partly as a bonding agent to link the pieces of fish together. Individual fillets are dipped before being frozen because this adhesive property helps bond together the flesh that would otherwise gape badly upon thawing.

It is unlikely that polyphosphates have any effect on eating quality other than the tainting that can occur from excessive use of dips. Claims have been made that dipping improves the flavor; however, these have not been substantiated. Dipping may mask some of the symptoms of deterioration in poor quality material and thus give the impression that quality is better than it really is. Polyphosphates have no effect on the storage life of either wet or frozen fish products.

3.2495

The fillets were kept at +4° C. in solutions containing either pyrophosphate alone at 1 percent or pyrophosphate at 3 percent with 5 percent of sodium chloride. The migration of tracer pyrophosphate was followed by applying the autoradiographic method. The sections of fillets for autoradiography were freeze dried and paraffin impregnated to avoid losses of soluble compounds. The migration of the radioactive phosphorus was quite rapid, and in 24 hours the sections were completely marked. The rate of migration was also estimated by direct counting of the radioactivity of similar sections.

Studies were also made of the changes in the phosphorus fractions of the fillets during the course of standing. A solution of 1 percent of pyrophosphate and a maximal standing time of 5 days were used. Initially there was a rapid loss of phosphorus compounds from the fillets. This loss was related to the lipid and nucleic acid phosphorus. The tracer migrated rapidly into the fillets during the first day; after this time, it migrated more slowly. The bulk of the tracer was in the acid-soluble fraction, and there was some incorporation into the lipids and nucleic acids.

These experiments to check the changes in the solubility of actomyosin confirmed the earlier findings that sodium chloride solution lessens the solubility of actomyosin, whereas the simultaneous presence of pyrophosphate prevents this change.

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Kuusi, Taina
Chemical Abstracts 67, No. 23, 107473s (December 4, 1967)

3.2495 CHANGES IN PROTEINS CAUSED BY FROZEN STORAGE

C. F. T. R. I.
FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.

4.3 THE DEHYDRATION OF FOODS IN EDIBLE OIL IN VACUO
I - STABILITY OF THE DRYING MEDIUM

Abrahami, N. (Human Nutrition Research Unit, National Institute for Medical Research, Mill Hill, London, N.W.7, England), and D. N. Naismith (Department of Nutrition, Queen Elizabeth College, Campden Hill, London, W.8, England)
Journal of Food Technology 3, No. 1, 55-68 (March 1968)

To predict the shelf life of dried foods, the authors studied the dehydrating method and the use of antioxidants on the stability of the oil used in the dehydrating medium. The effect of processing on the biological value of a protein-rich food was also studied. Arachis oil was used as the medium for dehydration. This oil showed considerable resistance to autoxidation when heated alone under the conditions used in the drying of foods. Processing cabbage, lean horse meat, and herring increased the stability of the arachis oil; oil that adhered to the surface of the products was even more stabilized. Continuous use of the oil did not increase its content of free fatty acids. Neither the drying medium nor the adherent oil became rancid after several weeks of storage; however, susceptibility to autoxidation was increased. The synthetic antioxidants, butylated hydroxytoluene (BHT) and sesamol, were added to the arachis oil before heating. These antioxidants acted synergistically with the natural antioxidants in the foods and markedly improved the stability of the oil. The net protein utilization (NPU) of herring dried in arachis oil in vacuo was as high as the NPU of freeze-dried herring.

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 ABSTRACTER: M. F. Tripple

4.62 COMPARISON OF ANTIOXIDANT ACTIVITIES OF TOCOL AND ITS METHYL DERIVATIVES

Olcott, H. S., and J. Van der Veen (Institute of Marine Resources, Department of Nutritional Sciences, University of California, Berkeley 94720)
Lipids 3, No. 4, 331-334 (July 1968)

Olcott and Emerson (1937) observed that the effectiveness of α-(5,7,8-trimethyl)-,β-(5,8-dimethyl)-, and γ-(7,8-dimethyl)-tocols as in vitro antioxidants did not parallel their effectiveness in overcoming the sterility of a vitamin E-deficient rat. γ-Tocol was the most effective antioxidant in lard or oleo oil at 75° C., whereas α-tocol was superior as the vitamin. Hove and Hove (1944) later suggested that the relative in vitro antioxidant effectiveness of α- and γ-tocols depended upon the temperature and that α-tocol was actually a superior antioxidant to γ-tocol at body temperature (37° C.). Lea (1960) compared these and other tocols in several substrates and at several temperatures and reported that the relative activities differed according to these variables. For example, α-tocol was a more effective antioxidant than the other tocols in a highly unsaturated fat and at low temperature. The substrates used in all these studies contained peroxides.

The hypothesis that vitamin E functions in vivo primarily as an antioxidant is supported by some investigators and questioned by others. Because more complete information was needed, the authors reinvestigated the antioxidant activities of α-,γ-, and δ-tocols and of unsubstituted tocol. Lea had reported that

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 ABSTRACTER: M. F. Tripple

4.81 USE OF FISH OILS IN MARGARINE AND SHORTENING

Hannewijk, J. (Unilever Research Laboratory, Vlaardingen, The Netherlands)
Reprinted from Fish Oils, Chapter 18, pp. 251-269 (Avi Publishing Company, Westport, Connecticut [1967])
Circular 279, 19 pp. (December 1967) (U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D.C. 20240)

Hardened whale oil has been used in margarine and edible fats for over 50 years in many countries. Hardened fish oil has also been used in foods, although to a lesser extent, because until recently the amount of fish oil available was smaller than that of whale oil. Now many countries have greatly increased their production of fish oil, whereas the production of whale oil has decreased.

The types of fish oil that are being marketed have also changed. Herring oil and menhaden oil imported from the United States formerly were marketed in Western Europe 10 to 15 years ago. Now anchovy oil from Peru is chiefly being marketed. Anchovy oil is characterized by an exceptionally high iodine value.

Hydrogenation is necessary to make marine oils suitable for use in edible fats. The highly unsaturated fatty acids must be removed or converted to less unsaturated acids or the flavor is adversely affected. Polymerization could also be used for this purpose; however, there are serious objections to the use of polymerized fats in foods.

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 ABSTRACTER: M. F. Tripple

6.131 (*) IMPROVED FISH SCRAP RECOVERY IN GERMAN PROCESSING PLANT

Anonymous
World Fishing 17, No. 3, 63-64 (March 1968)

For economic reasons, a fishmeal factory that processes scraps from a processing plant prefers to receive scraps that are as water-free as possible and waste water as free from residues as possible. A major fish-processing plant in Germany has installed a special vibrating conveyor to dewater the fish scraps. The input of fish scraps at the plant is 5 tons per hour. The conveyor is 59 feet in length and 11 inches wide in the trough.

On a vibrating surface, material is transported only if the impulses generated by the conveyor are sufficiently strong against the center of gravity of each individual piece. Larger amplitudes are required for feeds with a resilient envelope around the center of gravity than for material with a rigid texture because part of the amplitude is absorbed in the soft envelope. Therefore, the resonance conveyor used in the fishmeal plant is operated with a relatively large stroke of double amplitude.

Dewatering of fish scraps on the traditional screen cloths or perforated plates has not been satisfactory because the screen mats clog within a short time. A cascaded comb-screen-mat was developed for the fishmeal plant. The comblike steps of the mat are open in the direction of flow. Fine particles are

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 ABSTRACTER: M. F. Tripple

4.62

tocol was not as effective as γ-tocol under any of his variable conditions; a synthetic preparation of 5,7-dimethyl tocol had been included in his studies. Therefore, the authors also investigated 5,7-dimethyl tocol. Only purified substrates were used in this study.

Antioxidant activities of the tocols were compared at 37° C. in purified squalene and menhaden oil and at 50° C. in squalene. Duplicates within a single run usually showed the same induction periods; however, the results in separate runs were occasionally variable. α-Tocol was an inferior antioxidant as compared to the other tocols under all conditions except at low concentrations in menhaden oil at 37° C., where there was no apparent advantage. Initial weight gains occurred at about the same time, but the oil protected by γ-tocol did not continue to gain weight as rapidly. There was an increased rate of chain initiation typical of higher concentrations of α-tocol. The initial weight gain at a concentration of 0.2 μM per 200 milligrams was faster than the gain at 0.05 μM per 200 mg.; however, the "break" to a more rapid weight gain occurred after a longer incubation period.

The relative antioxidant activities of the tocols in squalene were generally the same as activities in menhaden oil. Squalene possessed advantages over other lipid substrates in that it was commercially available, was readily purified, and had a sharp break at the end of the induction period. The tocols in squalene showed the same relative order of antioxidant activity as in menhaden oil, but the data were more reproducible. Relative antioxidant effectiveness did not appear to be modified by the ethylene-interrupted double-bond system. Higher concentrations of α-tocol were necessary to show the initial prooxidant phenomenon in squalene than were required in menhaden oil. [17 references]

4.3 (Cross Reference: 3.6)

Herring was chosen as a material for dehydration because it may contain as much as 20 percent fat, which liquefies at the temperature of dehydration. Herring is particularly rich in the readily oxidized polyunsaturated fatty acids. During dehydration, the quantity of oil in the dehydration vessel was noticeably greater after 15 dehydrations than at the beginning. Analyses confirmed that some of the herring lipids had been transferred to the dehydrating medium during the drying process. The authors expected this transfer to affect the keeping properties of the oil adversely.

No decrease in the stability of the drying medium occurred. This is explained by the fact that herring oil has a relatively high content of α-tocopherol, and the release of α-tocopherol from successive batches of herring is sufficient to protect the oil from the adverse effects of repeated heating. This protection extended over a storage period of 9 weeks.

Sesamol appeared to be slightly superior to BHT in effectiveness as an antioxidant. The protective action of sesamol was more pronounced after several dehydrations. A synergistic action of α-tocopherol and sesamol would be the most likely explanation for the behavior of oil treated with sesamol. The oil adhering to the fish was more resistant to autoxidation than corresponding samples of the dehydrating oil were; the improvement in stability was ascribed to the contribution of natural antioxidants from fish during prolonged contact with oil. The authors concluded that BHT and sesamol acted on the oil by reinforcing the natural antioxidants of the fish. [19 references]

6.131

caught in the screen openings and are swept along by the succeeding feed material so that clogging is effectively counteracted. The individual cascades overlap; the blind part of a step is arranged underneath the screen part of the preceding cascade. Fines passing the screen openings are caught and moved forward so that a part of them are conveyed all the way to the discharge end. The screen mat is a compromise between the opposing demands of efficient dewatering through large screen openings and clean waste water through small screen openings.

A 5½-hp. splashproof motor drives the vibrating conveyor. A centrifugal force exciter produces the vibrating motion. The conveying trough performs a linear motion inclined towards the horizontal. The feed moves in small trajectories, and the continuous impulses free some of the adhering water. With the conveyor stopped, practically no water is passed through the screen mat onto the collecting tray, but a layer of water proportionate to the feed flows across the entire screen deck. With the conveyor operating, the vibrating impulses exceed the cohesion forces of the water so that behind each feed point the water has almost completely seeped through the screen deck.

The conveyor is mounted below floor level and is slightly inclined to aid water runoff. Installation of the conveyor below the floor provides good dewatering action and allows free passage in the work room.

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6.137 RECOVERY OF OIL AND PROTEIN FROM WASTE WATER

British Patent 1,098,716
Chemical Abstracts 68, No. 20, 89751v (May 13, 1968)

4.81

In the past, the primary objective of hydrogenation was an increase in melting point; at present, the objective is an improvement of taste. Because of this, vegetable oils are sometimes hydrogenated so that the liquid character of the oil is maintained. A similar hydrogenation of whale oil and fish oil does not give oils possessing the high standards necessary for human consumption because the fishy taste is insufficiently removed. Although the taste is improved as the melting point is raised, there is a limit to raising the melting point because the fat must be capable of melting in the mouth.

To obtain good stability in hardened fish oil, it is necessary to process the oil as fresh as possible and to refine it adequately before hydrogenation. There are no essential differences in quality between hardened herring oil and hardened whale oil. A low initial melting point and a high iodine value for nonhardened herring oil is desirable. Menhaden oil and pilchard oil, both of which are characterized by a high iodine value and a relatively high initial melting point, must be hardened as high as the oral response permits. Even then the hardening flavor cannot be completely removed. Fish oils with a high iodine value should be hardened in such a way that the temperature does not rise too much as this leads to undesirable isomerizations.

Three phases are present in hydrogenation: liquid phase (oil), gas phase (hydrogenation), and solid phase (catalyst). The author discusses these three phases plus hydrogen addition, isomerization reactions, selectivity, practical hydrogenation of marine oils, and control of the hydrogenation process. Dilatometry; post-refining and deodorization; flavor and keeping qualities of deodorized, hardened fish oil; and margarine and shortening are also discussed.
[19 references]

6.137 FISH SOLIDS FROM FACTORY EFFLUENTS

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Dreosti, G. M. (Fishing Industry Research Institute, Cape Town, Republic of South Africa)

Fishing News International 6, No. 11, 53-54 (November 1967)

Flocculable solids are usually removed from liquors by sedimentation or flotation, or both. Flotation by incorporating minute air bubbles into the floc has been used with flocculated fish material in fish factory effluent. The most common method of flotation by aeration involves pressurization--compression of air into part or all of the liquor to be treated, followed by release of the pressure in the flotation tank. Pressurization requires pressure pumps and containers, and necessitates the recirculation of a considerable proportion of the liquor being treated. The author felt that it might be possible to whip air into the liquor without using an air- or water-pressure system. Such a method worked successfully on fish factory effluent. This method of aeration might be applicable to the clarification or recovery of solids from a wide variety of liquors.

Good results were obtained with fish factory effluents containing concentrations of flocculable solids up to about 0.8 percent. Effluents with higher concentrations gave flocs that did not pack well at the surface of the clarified effluent. The air could be whipped into the effluent with any type of equipment that could beat it sufficiently vigorously. Good laboratory results were

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ABSTRACTER: M. F. Tripple

6.190 NUTRITIONAL VALUE OF FRESHWATER CRAYFISH WASTE MEAL

Lovell, Richard T., James R. Lafleur, and Fred H. Hoskins (Department of Food Science and Technology, Louisiana State University, Baton Rouge 70803)

Journal of Agricultural and Food Chemistry 16, No. 2, 204-207 (March-April 1968)

Fresh-water crayfish are a commercially important food product in areas along the Gulf coast. At the present time, the waste material from crayfish-processing plants, which is about 85 percent of the live weight of fresh-water crayfish, has no commercial value and its disposal is an expense to the industry. Because no information is available from which estimates of the nutritional value of crayfish waste meal can be made, a study was conducted to determine chemical and biological properties of the material. Knowledge of these properties would be useful in estimating the feeding value of the crayfish waste meal.

All feedstuffs containing crustacean shells also contain chitin, which is indigestible and has no protein value for monogastric animals. Several procedures have been used to analyze for chitin in crustacean shells; however, none has been universally accepted. As a result, three methods for measuring chitin in the crayfish meal were compared in this study.

The dried waste material consisted of shell, muscle, and viscera. The material was subjected to inorganic and organic analyses using an atomic absorption spectrometer and conventionally accepted methods of chemical analysis of feedstuffs. The true digestibility of protein in the crayfish waste meal was compared

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ABSTRACTER: M. F. Tripple

RECOVERY OF FISH SOLIDS FROM EFFLUENTS

COMPOSITION OF FRESH-WATER CRAYFISH MEAL

6.190 FISH MEAL QUALITY CONTROL AS IT AFFECTS FEED FORMULATION

Ousterhout, L. E. (Department of Animal Science, University of Rhode Island, Kingston, Rhode Island)

Feedstuffs 40, No. 17, 18-20 (April 27, 1968)

Fish meals contain measurable quantities of about 40 elements considered to be required by poultry. The following elements are economically important: protein, energy, available lysine, available methionine or methionine plus cystine, calcium, and phosphorus. The amounts of salt and fish oil in some meals must be considered important for their physiological effects. The nutritionist wants the easiest way to calculate the amounts of the important nutrients in each fish meal so that he can determine how much fish meal to buy and how much to use in the feeds. Computer programming simplifies this task, because the nutrient content of each fish meal can be fed into the computer, and the computer will do the rest.

Most analytical laboratories can determine protein content by the Kjeldahl method, which measures total nitrogen. Calcium and phosphorus analyses are more involved. Methods for determining available amino acids are still being developed. Determinations of metabolizable energy are too costly and lengthy to run for each meal. The nutritionist must look for procedures that can be easily conducted in most laboratories and that will give him sufficient information to estimate the nutrient data needed for computer formulation.

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ABSTRACTER: M. F. Tripple

6.54 THE FISH PROTEIN CONCENTRATE STORY
PART 6. QUINTERO FISH PROTEIN CONCENTRATE:
PROTEIN QUALITY AND USE IN FOODS

Yanez, Enrique (Centro de Investigaciones de la Nutricion and Laboratorio de Investigaciones Pediatricas, Universidad de Chile, Santiago), Ita Barja, Fernando Monckeberg, Alejandro Maccioni, and Gonzalo Donoso

Food Technology 21, No. 12, 60-66 (December 1967)

The manufacture of FPC (fish protein concentrate) is suited to the conditions in Chile, because there is an abundance of raw material and because lysine-rich FPC is appropriate for enrichment of lysine-deficient foods from wheat, which are a staple in Chile. A pilot plant was established for production of defatted, deodorized FPC suitable for children's diets. This plant now manufactures 300 tons of FPC annually from local hake. A description of the plant equipment and the manufacturing process is given.

The composition of the hake used in the manufacture of FPC in Chile is quite variable, so the chemical composition of different batches of FPC varies. The protein content of the samples is uniformly high at over 73 percent; the oil content is quite low; and water is present in amounts compatible with good storage properties. The quality of protein is good and compares well with that of casein at a similar concentration. The values of NPU (net protein utilization) for the

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ABSTRACTER: M. F. Tripple

FEED FORMULATION WITH FISH MEAL

CHILEAN FISH PROTEIN CONCENTRATE

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with that of methionine-supplemented soy protein. Ten samples of meal had the following mean composition values:

Average composition of fresh-water crayfish waste meal[1]

| Component | Quantity present in meal |
|---|---|
| Minerals | |
| Magnesium (p.p.m.) | 2,656.0 |
| Manganese (p.p.m.) | 157.0 |
| Potassium (p.p.m.) | 1,400.0 |
| Iodine (p.p.m.) | 1,313.0 |
| Iron (p.p.m.) | 8.8 |
| Calcium (%) | 18.1 |
| Phosphorus (%) | 1.2 |
| Corrected crude protein (%) | 32.2 |
| Ether extract (%) | 4.9 |
| Chitin (%) | 14.1 |
| Crude fiber (%) | 14.2 |
| Ash (%) | 29.0 |

[1] Each determination was the average of 10 samples.

The most accurate method of chitin determination proved to be the cold hydrochloric acid (HCl) method in which a mixture of 5 percent HCl and crayfish meal is agitated 24 hours at room temperature for decalcification, followed by reflux over steam with 5 percent sodium hydroxide for 1 hour. This method of determination showed that crayfish meal contained 14.1 percent chitin and that 19.8 percent of total nitrogen was in the form of chitin.

The digestibility coefficients for chitin-free protein were 87.54 percent in crayfish waste and 86.61 percent in soy protein. [12 references]

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FPC after months of storage under unfavorable conditions correspond to those of a good-quality protein. The NPU was increased by adding methionine, but not by adding lysine, which fact means that sulfur-containing amino acids are the ones that limit the biological value of the Chilean FPC.

The growth performance of rats fed a diet containing 24 percent FPC was similar to that of animals fed a diet containing 24 percent casein. Feeding the rats a diet of 30 percent FPC for three generations resulted in growth that was comparable to that shown by animals fed a commercial rat food. No special pathological signs were noted. The FPC was then fed to a group of 3- to 5-month-old babies as the sole source of protein. The increase in weight over the 2 months of the feeding experiment was satisfactory, and was comparable to weight gains obtained with an American FPC. The authors consider these trials as definite proof of the good quality of the protein in Chilean FPC.

The most promising use of wheat products enriched with FPC in Chile seems to be in bread, pastas, and roasted whole wheat meal. Although the results of acceptability trials with FPC-enriched bread were encouraging, long-term feeding trials must be carried out. The addition of FPC to bread increased the protein value from 3.7 to 6.1, which was similar to the increase obtained by adding 12 percent skim-milk powder. This increase was due to the higher content of protein in the enriched bread and the increase in its protein quality. When adults were given a ration of FPC-enriched spaghetti, there was suspicion of the real nature of the spaghetti. Results of analyses confirmed that enrichment of spaghetti is superior to that of bread because of preservation of the protein quality of FPC. [16 references]

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obtained with a high-speed rotary-blade blender, an ordinary egg beater, or a centrifugal pump with a suitable air leak at or near the intake.

To obtain optimum results, the following procedures are necessary for fish factory effluent. The amount of air required for flotation is small and the agitation time is 1 or 2 seconds. When using a centrifugal pump, an extremely small optimum air leak is required as the admission of too much air results in the formation of large air bubbles, which disrupt the floc. The admission of air must be at the optimum. There are circumstances when the effluent should stand for several minutes or be stirred gently for a few seconds after the air is whipped into it to allow air bubbles to escape. The flocculant is added by whipping either immediately after aeration or after optimum delay. After the flocculant is vigorously stirred into the aerated effluent for a second, a gentle stirring for a minute or two is sufficient before letting stand for the floc to rise to the surface. The results are better when the flocculant is added after aeration.

It takes only about 5 minutes for the floc to rise to the surface and leave a clarified effluent. The floc can be skimmed off the effluent or drawn off pneumatically. [9 references]

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6.137 FOOD PATENTS. FISH OIL RECOVERY

British Patent 1,070,128
Food Technology 21, No. 10, 78-80 (October 1967)

A centrifugal apparatus separates the flushing water of a fish-cutting machine into fractions that contain fine solids, oil-free water, and an oil-in-water emulsion.

[Abstracter: A. Reed]

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Fish meals differ widely in composition and in nutrient availability. The proximate composition pattern will generally show an almost direct inverse relation between protein and ash. Protein and ash together total slightly over 80 percent. As fat and moisture are the only other major constituents of true fish meals, the protein, ash, fat, and moisture should theoretically total 100 percent. Protein and ash vary according to the bone-to-muscle ratio of the fish. If ash is determined and corrected for the salt content, the calcium and phosphorus content can be estimated sufficiently for use in formulation.

The energy content is obtained from two meal fractions, the digestible protein and the digestible fat. There is a good, direct relation between the ether-extractable fat and the digestible fat. One of the easiest methods for estimating protein quality and digestibility is the pepsin digestibility test. By comparing a number of determined metabolizable energy values and the protein, fat, and pepsin digestibility, equations can be developed for estimating the metabolizable energy content of a specific fish meal. The factors can then be applied to the determined protein, fat, and pepsin digestibility figures.

Estimation of available amino acids can be conducted in a similar manner. Equations are given for estimating the available lysine, available methionine, and available sulfur amino acids in fish meals. By checking the protein, pepsin digestibility, and ash and fat content of a fish meal, and by performing calculations, the estimates of key nutrient content needed for both computer formulation and decisions on purchase can be arrived at. The factors that must be used to perform the required calculations still need study, and the author cautions that the equations given in this paper must be considered quite tentative.

7.595 ANTIOXIDANT ACTIVITY OF SQUALENE

Rao, M. K. Govind, and K. T. Achaya (Regional Research Laboratory, Hyderabad-9, India)
Journal of the American Oil Chemists' Society 45, No. 4, 296 (April 1968)

Tocopherols, which function as antioxidants, occur in natural fats to the extent of 40-90 milligrams per 100 grams of oil. Squalene, a hexane hydrocarbon, is present in quantity in fish fats. The effect of squalene on autoxidation has received little attention.

Concentrates of methyl oleate, with an iodine value (I.V.) of 86.5 and initial peroxide value (POV) of 2, and linoleate, with I.V. of 162.5 and a POV of 11, were kept in glass beakers in an oven at 63° C. with and without incorporation of 0.02 percent each of squalene and tocopherols. The POV's were determined at 24-hour intervals. The squalene used was isolated by repeated chromatography of the unsaponifiables from olive oil, which contained 183 mg. of squalene in 100 g. of oil. The tocopherols used for the comparative study were the unsaponifiables of safflower oil, which was freed of sterols by digitonin precipitation. Tocopherols from safflower oil consisted of about 50 percent of the α-form and about 25 percent each of γ- and δ-tocopherols. The tocopherol concentrate had strong antioxidant action; the squalene and other unknown unsaponifiable constituents present probably had only a small effect on the protective action.

The results of the stability trials showed that the increase in POV was about linear for the first 4 days. During this period the squalene had a better

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 ABSTRACTER: M. F. Tripple

7.89 DETERMINATION OF SHELL IN CRABMEAT, CLAMS, AND OYSTERS

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Osman, Evelyn M. (Food and Drug Administration, 1141 Central Parkway, Cincinnati, Ohio 45202)
Journal of the Association of Official Analytical Chemists 51, No. 3, 521 (May 1968)

The previous method (1961) for the determination of shell in crab meat was expanded to efficiently and rapidly determine the shell content of clams and oysters.

Determination of shell in crab meat.--Weigh 57 grams of the sample into a 400-milliliter beaker. Add 150 ml. of 1.5 percent NaOH solution and stir to break up the sample. Add 10 drops of 1 percent aqueous Alizarin Red S indicator. Heat the sample for 10 min. at about 80° and stir three or four times to digest the meat. Pour the digested meat onto a No. 12 sieve nested in a No. 60 sieve, and wash with water. Wash the shell that is retained on both sieves onto weighed paper, dry at 100°, and cool to room temperature. Weigh and count the shell; report as number of pieces and as weight per pound.

Determination of shell in clams and oysters.--Weigh 57 g. of sample into a 600-ml. beaker. Follow method used for crab meat except boil for about 15 min. for digestion.

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 ABSTRACTER: M. F. Tripple

7.80 CHEMICAL SPOILAGE PATTERN OF GRAYFISH

Stansby, M. E. (Bureau of Commercial Fisheries Food Science Pioneer Research Laboratory, Seattle, Washington), George Kudo, and Alice Hall (Bureau of Commercial Fisheries Technological Laboratory, Seattle, Washington 98102)
Food Technology 22, No. 6, 107-110 (June 1968)

The grayfish, sometimes called spiny dogfish, is a small species of shark that occurs throughout the world and is quite common in the Pacific Northwest. At one time the grayfish supported a large vitamin A industry because of the high content of vitamin A in the liver oil. This industry has ceased to exist in the United States because of competition from synthetic vitamin A. Since the grayfish are no longer harvested for their liver oil, the schools of these fish have increased. The presence of large schools of grayfish in commercial fishing grounds has created a nuisance, and the fishermen would like to see the grayfish population reduced. One proposed method is to harvest the grayfish for use as animal or human food.

Grayfish, like other sharks, contain more than 1 percent of urea. One argument against the utilization of grayfish as human food is based on the assumption that possible deterioration of the urea through bacterial action will result in volatile bases, particularly ammonia. The likelihood of grayfish yielding excessively large amounts of ammonia during refrigerated storage would severely limit the time grayfish can be held before spoilage renders the fish unsuitable for human consumption.

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 ABSTRACTER: M. F. Tripple

9.7 DOCUMENTATION PROGRAM LAUNCHED

Stewart, George F.
Food Technology 22, No. 6, 55-56 (June 1968)

The Institute of Food Technologists has joined forces with the Commonwealth Agricultural Bureaux, a technical arm of the British Commonwealth of Nations, and The Institut für Dokumentationswesen, a research institute of the German Federal Republic, in establishing documentation services for the food industry and those agencies and institutions serving it. After 6 years of intensive study and planning, a documentation program named the International Food Information Service (IFIS) is being started.

The first project will be publication of Food Science and Technology Abstracts. This monthly journal in English will contain not only conventional abstracts but also keyword and author indices. The keyword index will provide ready access to the specific subject matter of the abstracts. The number of terms used will be sufficient to identify the specific nature of the original article. The indexing terms will be compiled and an official word list will be published. This list will be used as a basis for a computer-generated retrospective searching service. An author index will be included in each issue. Cumulative keyword and author indices will be published each year.

An attempt will be made to provide abstracts from a majority of the technical literature on foods, as well as literature on chemistry and biochemistry of foods

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 ABSTRACTER: M. F. Tripple

7.80 (Cross Reference: 1.71)

The purpose of the research reported here was to investigate the spoilage pattern of grayfish to determine the type of deterioration that actually occurs. While investigating the spoilage pattern, the authors also studied the development of volatile bases and of rancidity.

A value of 30 milligrams of volatile-base nitrogen per 100 grams of fish has been judged to correspond to the threshold between fish that are deteriorated, yet still edible, and fish that are decomposed (Tanikawa, 1938). The initial values for the fresh grayfish used in this study ranged from 4.1 to 9.2 mg. nitrogen per 100 g. of fish. The maximum value reached at extreme spoilage was 36.8 mg. of nitrogen. All the other values obtained were below 30 mg. of nitrogen, which are even less than the values obtained with teleost fishes. Trimethylamine values did not differ markedly between grayfish and those found for other species of fish. The trimethylamine values for grayfish held on ice for 2 weeks ranged from 0.15 to 1.72 mg. per 100 g. of fish.

Rancidity was determined by means of peroxide tests and sensory evaluations by an experienced taste panel. Peroxide values of some of the samples exceeded 20 after the grayfish had been stored in ice for as little as 3 days. These findings were substantiated by the taste panel, who noted rancid flavors in the fish when peroxide values were above about 2. On the basis of volatile-base values, peroxide values, and sensory evaluations, the investigators concluded that rancidity, not bacterial spoilage, was the principal factor limiting the ice-storage life of grayfish. [14 references]

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and food components, their physical composition and physical properties and sensory evaluation, and consumer acceptance. A careful selection of journals and publications will allow coverage of a high percentage of the literature in this field. Present plans call for the abstracting of articles from 400-500 journals.

A unique system has been developed for preparing the indices and for printing the abstract journal. A computer will be used to generate the keyword and author indices for each issue and for the cumulative annual index. This system will allow more rapid and accurate indexing than is possible with manual operations. Another computer will be used to operate the linotype machines for typesetting. An efficient photo-offset system for reproduction, also computer generated, may be used rather than conventional printing.

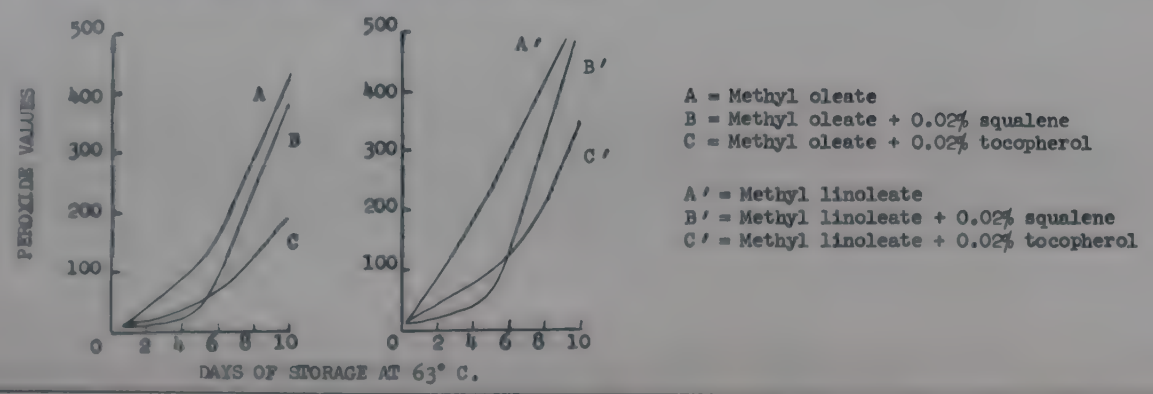
If the abstracts and copy services prove to be successful, other services will be offered on a fee basis. One service that could be offered would be a retrospective searching service. All that is needed is a reasonably standardized word list and a suitable program for the appropriate computer, because the abstracts and indices will be recorded and stored on magnetic tapes. This service would be valuable for those wishing to scan quickly what literature on a given subject has been abstracted.

The selective dissemination of information (SDI) system has been recently developed and appears to have great usefulness for those requiring current awareness and abstracting services with a minimum of delay. SDI is a computer-generated program for scanning titles or key worded-indexed abstracts for articles of specific interest. The end product is a printout of citations or of complete abstracts. With this system, the author says, it would not be necessary to see the abstract or journal at all.

7.595

protective action than the same quantity of mixed tocopherols had. The POV of methyl oleate increased per day about 7 units and 22 units in the presence and absence, respectively, of 0.02 percent of squalene; the corresponding figures for methyl linoleate were 11 and 50 units, respectively. During the subsequent storage period, the tocopherols continued to exert their protective effect, whereas the protective action of squalene was lost and the rate of POV increase became greater than that of the control. The authors suggest that the oxidation products of squalene might be prooxidant, as has been suggested for other polyene materials. Squalene per se is initially an antioxidant but subsequently behaves as a prooxidant. [11 references]

PEROXIDE VALUES OF METHYL OLEATE AND LINOLEATE




7.89

Seven collaborators were sent blank samples and five vials each of crab meat and clam meat containing shell. All the collaborators correctly reported no shell in the blanks, and the added shell was easily recovered from the contaminated samples. The method was found to be efficient and effective for qualitative recovery of shell. Reporting the amount of shell by count and weight per pound conforms with the "spitting index" for crab cake; with this method of determination, the number of pieces of shell that stick the eater is counted.

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7.89 EFFECT OF COOKING PROCEDURE ON FLAVOR COMPOUNDS OF BEEF. CARBONYL COMPOUNDS

Sanderson, Anne, A. M. Pearson, and B. S. Schweigert (Department of Food Science, Michigan State University, East Lansing, Michigan)
Journal of Agricultural and Food Chemistry 14, 245-247 (May-June 1966)

Gas-liquid chromatography was used to determine the carbonyl compounds that resulted from roasted and boiled beef. The aldehydes and ketones were collected as their 2,4-dinitrophenylhydrazine derivatives. They were regenerated as carbonyls with levulinic acid for injection into the chromatograph. Tentative identifications were made by comparing the retention times with known carbonyl compounds.

The beef cooked with water gave the same number of aldehydes and ketones as did the beef cooked in fat; however, the aldehydes and ketones were in varying amounts. The results suggested that the characteristic differences in flavor and aroma between roasted and boiled beef may come from the volatile carbonyl compounds. [13 references.] [Abstracter: M. F. Tripple]

EFFECT OF COOKING ON BEEF CARBONYL COMPOUNDS

0.2 (*)

## PERFORMANCE OF MONOLAYER BLENDS OF ODD AND EVEN CARBON CHAIN ALCOHOLS IN WATER EVAPORATION SUPPRESSION

Foulds, Emmett L., Jr., and Russell G. Dressler (Trinity University, San Antonio, Texas)
Industrial and Engineering Chemistry, Product Research and Development 7, No. 1, 75-79 (March 1968)

The rate of evaporation of water can be retarded by spreading a monomolecular layer on the water. Saturated alcohols are more effective in retarding evaporation than are some 175 miscellaneous fatty alcohols, fatty acids, and organics. As the chain length of pure odd- and even-chain alcohols, used individually, increases, the retardation increases. In this study, mixtures of these compounds, having an alkyl chain length of from 14 to 20 carbon atoms, were investigated to determine if they would produce a similar rate of retardation.

When the monomolecular film was kept at equilibrium surface pressure at the air-water interface, the resistance to evaporation increased as the chain length of the alcohols increased. The efficiency of the film depended on its composition and on the meteorological conditions at the interface. Certain mixtures were extraordinarily efficient, appreciably more so than those of the pure compounds. The efficiency of these mixtures was as high as 82 percent; that of standard commercial fatty alcohols is between 50 and 55 percent. [11 references]
[Abstracter: L. Baldwin]

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0.33 (*)

## NEW QUANTITATIVE APPROACH TO THE STUDY OF NONENZYMATIC BROWNING

Talley, Eugene A., and William L. Porter (Eastern Utilization Research and Development Division, U.S. Department of Agriculture, Philadelphia, Pennsylvania 19118)
Journal of Agricultural and Food Chemistry 16, No. 2, 262-264 (March-April 1968)

The authors have simplified the study of the Maillard reaction by combining previous techniques and carrying them a step further. Small filter-paper disks are treated with combinations of amino acids and sugars in solution. After the disks are dried, they are fried in deep fat to simulate frying of potato chips. The fat is washed out with carbon tetrachloride. The disks of paper are dried and placed directly onto the ion-exchange column of an amino-acid analyzer. The intermediates of the browning reaction (ninhydrin-active compounds) and the residual amino acids are separated and measured. Because automatic sugar analyzers are becoming commercially available, it should be possible to study the changes in sugar components in the same way. The model system can also be used to simulate storage problems in dehydrated foods under controlled conditions.
[17 references] [Abstracter: M. F. Tripple]

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0.31 (Cross Reference: 4.2) (*)

## THE BIOSYNTHESIS OF WAX ESTERS FROM LABELLED ACETATE, FATTY ACIDS, AND LONG-CHAIN ALCOHOLS IN FISH MUSCLE

Nevenzel, Judd C., and Mitsu Kayama
Federation Proceedings 27, No. 2, Abstract No. 2427, p. 647 (March-April 1968)

Wax esters are the principal type of lipid in several different families of marine fishes. The midwater lantern fishes, family Myctophidae, were used in this study. In the lantern fish, 70 to 90 percent of the total lipid consisted of wax esters ranging from $C_{30}$ to $C_{38}$; the wax esters were mainly hexadecyl oleate and hexadecyl palmitoleate. Acetate labeled with $^{14}C$ was injected intramuscularly. Within 1 to 3 hr. following the injection, 1 to 5 percent of the 1-hexadecanol, palmitic acid, or oleic acid was incorporated into the wax esters and preferentially incorporated into the alcohol rather than the acid moiety. The individual fatty acid or alcohol homologs and chemical degradations were isolated to locate the $^{14}C$-atoms and to provide detailed information about the biosynthetic pathways. The results suggest that in the muscle of the lantern fish the following occurs: (1) the initial synthesis of fatty acids and long-chain alcohols readily takes place; (2) fatty acid and long-chain alcohols are interconvertible, at least for the saturated $C_{16}$ homologs; and (3) endogenous or exogenous long-chain alcohols are preferentially esterified to wax esters.
[Abstracter: M. F. Tripple]

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0.5 (*)

## ISOLATION AND ROLE OF NONHEME IRON PROTEIN IN CLOSTRIDIUM BOTULINUM

Dyer, John K., and A. W. Anderson (Department of Microbiology, Oregon State University, Corvallis 97331)
Applied Microbiology 16, No. 2, 207-211 (February 1968)

The purpose of this investigation was to isolate, identify, and compare the ferredoxin from a proteolytic type of Clostridium botulinum with the ferredoxin from a nonproteolytic type, and to examine the association of ferredoxin with hydrogen evolution.

A type of iron-bound protein was isolated from C. botulinum by modifying the method used for isolating ferredoxin from C. pasteurianum. The modified method involved acetone and diethylaminoethyl cellulose treatments and ammonium sulfate fractionation. The protein showed maximal absorption in the ultraviolet region near 260 mμ. Portions of this isolated iron protein were separated by disk electrophoresis. After specific iron-bound protein staining, the ferredoxin showed a positive reaction in the same position on the gel column as was first shown by use of cell-free extract. The evidence accumulated with a cell-free extract of C. botulinum suggested that pyruvate was metabolized through a phosphoroclastic system as demonstrated in other clostridia. The authors believe it is probable that ferredoxin is an electron mediator between pyruvate oxidase and hydrogenase for hydrogen evolution and acetyl phosphate formation.
[11 references] [Abstracter: M. F. Tripple]

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0.31 (Cross Reference: 7.773)

## LOSSES OF FATTY ACIDS DURING THE SAPONIFICATION EXTRACTION OF SMALL SAMPLES

Van der Veen, J., B. F. Medwadowski, H. S. Olcott (Institute of Marine Resources, University of California, Berkeley 94720)
Lipids 3, No. 2, 189-190 (March 1968)

When 10 mg. of the residual lipid of fish protein concentrate (FPC) was saponified by James' method (1960), modified, only 10-20 percent of the amount of fatty acids expected was recovered. The authors first analyzed the FPC lipids by varying the saponification conditions; then they analyzed pure fatty acids by the modified James method.

The results showed that appreciable amounts of fatty soaps may be lost from small samples of lipids when saponified mixtures are extracted with ether. To diminish the loss, the experimenter should backwash the ether extract copiously with water. If the amount of true nonsaponifiable material in the lipid fractions is small, the total lipid fatty acids should be analyzed by the transmethylation procedures used for purified lipids; the nonsaponifiable fraction should not be separated before the procedure is begun. [Abstracter: L. Baldwin]

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0.38 THE SEASONAL CHARACTER AND SPECIFIC PECULIARITIES OF THE ADENOSINETRIPHOSPHATASE ACTIVITY OF FISH MUSCULAR TISSUE

Kangur, A.
Chemical Abstracts 68, No. 19, 84495e (May 6, 1968)

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0.5 BIOLOGICAL PROPERTIES AND CHEMICAL NATURE OF THE ANTIBIOTIC FROM BIDENS CERNUA

Bondarenko, A. S., L. A. Bakina, E. M. Kleiner, V. I. Shelchenko, M. A. Gil'zin, A. S. Khokhlov, N. M. Poddubnaya, and T. I. Skorobogat'ko (Inst. Mikrobiol. Virusol, Kiev, U.S.S.R.)
Chemical Abstracts 68, No. 19, 85073c (May 6, 1968)

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0.2 RATES OF MOISTURE SORPTION AND DESORPTION IN POROUS, DRIED FOODSTUFFS

King, C. Judson (Department of Chemical Engineering, University of California, Berkeley 94720)
Food Technology 22, No. 4, 165-171 (April 1968)

Some of the ways heat and mass transfer can happen are explored, and some of the ways these two processes can interact to govern rates of moisture sorption by and desorption from dried foods are analyzed. The analysis accounts for the magnitude of observed sorption and drying rates at low moisture content and for the effect on these rates of pressure, temperature, piece size, and moisture content. [11 references] [Abstracter: L. Baldwin]

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0.118 A RAPID AND ACCURATE DEVICE FOR CALIBRATING THE WARBURG RESPIROMETER

Yamaguchi, M., F. C. Howard, and H. D. Pratt (Department of Vegetable Crops, University of California, Davis)
Analytical Biochemistry 16, No. 2, 338-342 (August 1966)

This calibrating device enables one to determine rapidly and accurately the volume of the manometer and attached vessel. [Abstracter: F. Bruce Sanford]

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0.5 AFLATOXINS IN FEEDS--A REVIEW

Phelps, Richard A. (National Cottonseed Products Association, Memphis, Tennessee)
Trout Hepatoma Research Conference Papers, Research Report 70, 145-159 (1967) (U.S. Department of the Interior, Bureau of Sport Fisheries and Wildlife, Washington, D.C. 20240)

The chemistry, biological effects, occurrence, and measurement of the class of mold toxins called aflatoxins are reviewed. Aflatoxins have a known structure, affect many species of animals, exert their primary effect on the liver, are extremely toxic and carcinogenic, and have appeared all over the world. Although aflatoxins are easily removed from vegetable oils, they continue to be a problem in feedstuffs. The author urges the prevention of aflatoxin contamination by control of moisture and temperature, especially in the rapid drying of peanuts after removal from the ground. Research to develop methods of removing aflatoxins from contaminated products is continuing. The author feels it is only a matter of time until all feeds can be made free from aflatoxins. [87 references] [Abstracter: M. F. Tripple]

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0.34 DETERMINATION OF SELENIUM IN BIOLOGICAL MATERIALS

Ewan, R. C. (Departments of Meat and Animal Science and Biochemistry, University of Wisconsin, Madison 53706), C. A. Baumann, and A. L. Pope
Journal of Agricultural and Food Chemistry 16, No. 2, 212-215 (March-April 1968)

The wet-digestion method of Cummins et al. (1965) and the coprecipitation technique of Allaway and Cary (1964) were combined to form a fluorometric method for the rapid determination of submicrogram amounts of selenium in rat, lamb, and plant tissue. The fluorometric method combines wet digestion of organic samples, coprecipitation of selenium with arsenic, and measurement of fluorescence with 2,3-diaminonaphthalene. The recovery of organically bound selenium-75 was 95 percent when the complete procedure was used. Recoveries were 103 percent when selenite was added to plant materials. Satisfactory agreement was obtained between the fluorometric method and other analytical methods. The new method allowed estimation of the selenium content of samples containing 0.01 p.p.m. of selenium. The coefficient of variation was less than 7 percent when the samples contained more than 0.1 p.p.m. of selenium. The fluorometric method has the advantages of speed and accuracy. [13 references]
[Abstracter: M. F. Tripple]

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0.34 PYROLYSIS OF POLYCARBONYL COMPOUNDS. 1. MASS SPECTRAL AND PYROLYTIC FRAGMENTATION OF INDANETRIONE

Brown, R. F. C., and R. K. Solly
Australian Journal of Chemistry 19, No. 6, 1045-1057 (June 1966)
Australian Science Index 10, 335 (July 1966)

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CHEMISTRY AND BIOCHEMISTRY

CHEMISTRY AND BIOCHEMISTRY
LABORATORY APPARATUS AND EQUIPMENT

TOXICITY
BACTERIOLOGY
INORGANIC ANALYSIS
CHEMISTRY AND BIOCHEMISTRY

0.5 (*)

## GROWTH AND SPORE PRODUCTION OF CLOSTRIDIUM BOTULINUM TYPE E IN CHEMICALLY DEFINED MEDIA

Strasdine, G. A., and Joanne Melville (Fisheries Research Board of Canada Vancouver Laboratory, Vancouver, British Columbia)
Journal of the Fisheries Research Board of Canada 25, No. 3, 547-553 (March 1968)

In previous studies (Strasdine, 1967; Strasdine and Kelly, 1967), the authors used the characteristic high degree of sporulation exhibited by the Minnesota strain of Clostridium botulinum Type E in trypticase-peptone medium to obtain large yields of spores. The authors realized the advantages of using chemically defined media for growth and spore production. Therefore, a series of investigations leading to the development of such a medium was undertaken. The defined medium described in this report promotes good growth and maintains the high degree of sporulation that is characteristic of the Minnesota strain of C. botulinum.

Omitting any amino acid or vitamin from the medium did not prevent growth, although marked changes in morphology or reduced growth were usually evident. An exception to this finding was the retarded spore germination and inhibited spore outgrowth when valine was omitted. Choline was an essential factor in promoting cell division, and it was capable of exerting this action after maximum growth was obtained. Spore development in the defined medium was markedly influenced by the source of available carbon. Spore development ranged from complete sporulation of cultures grown on maltose and glucose to complete inhibition with galactose.

[Abstracter: M. F. Tripple]

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2.117 (*)

## NEW AUTOMATIC HATCH COVER

Anonymous
International Cargo Handling Coordination Association Bulletin 8, No. 8, 9 (1966)
World Fisheries Abstracts 18, No. 4, 5-6 (October-December 1967)

A new automatic hatch cover is claimed to incorporate several major technical improvements: (1) the transverse joint wedges have been replaced by automatic cleating and the eccentric wheels by normal wheels; (2) covers are automatically operated, by means of a short multipull chain, and automatically secured on the coaming; (3) cover sections are connected by link rods instead of chains; and (4) all moving parts are equipped with self-lubricating bearings, so greasing is eliminated.

The transverse cleating comprises two torsion bars that are fitted at the end of the cover section between each transverse joint. Evenly spaced cleats to the bars engage on pressure pads, which are welded to the adjacent cover section. When the covers move downward, the bars move in rotation. This rotational movement ensures locking between cleats and pads and, thus, a firm locking of two adjacent sections. At the completion of the closing operation, the cover is compressed against the coaming in a watertight joint.

This automatic cleating resists all relative movement that may be caused either by the impact of the sea or by the shocks of loading. Thus it maintains the compression of the rubber gaskets that is necessary for watertightness.

[Extractor: L. Baldwin]

*Items on back of card.



1.82 (*)

## THE ATLANTIC COAST SURF CLAM - WITH A PARTIAL BIBLIOGRAPHY

Yancey, Robert M. (Bureau of Commercial Fisheries, Oxford, Maryland 21654), and Walter R. Welch
Circular 288, 14 pp. (June 1968) (U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D.C. 20240)

This report summarizes existing information about the surf clam (Spisula solidissima solidissima Dillwyn) fishery and its history, as well as information about the distribution, abundance, and biology of this species.

An important commercial fishery for the surf clam exists along the coasts of the Middle Atlantic States of the United States. Since 1949, the major portion of the catch has been taken off New Jersey. Vessels fishing for surf clams are equipped with hydraulic jet dredges and take the clams from depths of 100 feet or less. Clams are landed on the same day they are caught. Most of the catch is processed as food; a minor portion is used as fish bait. The total catch of surf clams in 1965 was 44.1 million pounds of meat.

Surf clams are found in water of oceanic salinity, on sand or gravel bottoms, from the low-tide line to depths of 480 feet. The range of the clams extends from the Gulf of Saint Lawrence to Cape Hatteras, North Carolina. Populations of 1 to 2 million juvenile clams per mile of beach have been found at Wallops Island, Virginia, and Sandy Hook, New Jersey. As many as 5 million mature clams per mile of beach have been washed up by a storm on Long Island, New York. The commercial length for surf clams is 5 inches and is reached in 4 to 5 years. It may take 13 years for a surf clam to mature and reach a length of 6 to 7 inches.

[134 references]

[Abstracter: M. F. Tripple]

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2.1471 (Cross Reference: 1.85) (*)

## EFFECTS OF RADIUS AND DIRECTION OF SEMICIRCULAR TOW NEAR THE SHORELINE ON CATCH OF POSTLARVAL SHRIMP (PENAEUS SPP.) WITH THE RENFRO BEAM TRAWL

Caillouet, Charles W., Jr. (Institute of Marine Sciences, University of Miami, Miami, Florida 33149), Ronald J. Dugas, and Bennie J. Fontenot, Jr.
Transactions of the American Fisheries Society 97, No. 2, 127-130 (April 1968)

In hopes of reducing the time and effort necessary to sample postlarval shrimp (Penaeus sp.) with the beam trawl, the authors investigated the effects on the catch of radius and direction of semicircular towing with the Renfro beam trawl.

Two experiments involving sampling of postlarval shrimp in the beam trawl were conducted. Each experiment consisted of six combinations of three radii (50, 100, and 150 feet) and two directions (clockwise and counterclockwise) of a semicircular tow of the trawl. Each treatment combination was repeated six times. Tows of a 50-ft. radius provided a measure of relative abundance of postlarvae that was no less efficient than measures of abundance provided by tows of greater radius. The catches obtained with clockwise and counterclockwise tows differed in one experiment, so the authors suggested that no fewer than two semicircular tows in opposite directions be taken to sample postlarvae with the beam trawl.

[Abstracter: M. F. Tripple]

*Item on back of card.

1.84 TRENDS IN THE ATLANTIC SEA SCALLOP FISHERY

Posgay, Julius A. (Bureau of Commercial Fisheries Biological Laboratory, Woods Hole, Massachusetts 02543)
Commercial Fisheries Review 30, No. 5, 24-26 (May 1968) (Separate No. 814)

This article explains the changes that have occurred in the Atlantic sea scallop fishery during the past 10 years. New boats for the scallop fishery have been built in Canada, whereas the U.S. fleet has declined. Landings initially rose to unprecedented high levels, but in recent years they have declined. Prices dropped in the face of abundance, recovered, then rose dramatically when the abundance of supplies declined moderately.

[Abstracter: M. F. Tripple]

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2.149 HOW SEA SURFACE TEMPERATURE MAPS AID TUNA FISHERMEN

Hynd, J. S. (CSIRO Division of Fisheries and Oceanography, Cronulla, New South Wales, Australia)
Australian Fisheries Newsletter 27, No. 5, 23-29 (May 1968)

Australian tuna fishermen have learned that the best schools of tuna are found only in waters with temperatures in the range of 62°-68° F. Within this temperature range, bluefin tuna are most likely to be found where there are sharp discontinuities in surface temperature or "fronts." For a number of reasons, fishermen at times have difficulty locating areas with favorable surface temperatures. If maps showing the surface temperatures of fishing grounds could be produced cheaply and quickly, they would be of great benefit.

With the advent of the infrared radiation thermometer, it is now possible to prepare maps of large areas quickly, and maps of tuna fishing grounds are now a practical proposition. The instrument works on the principle that within a certain range of wave lengths, the amount of infrared radiation emitted by an object is proportional to its surface temperature. The instrument is ideal for making continuous recordings of temperatures of the sea surfaces from an aircraft.

A record catch of more than 4,000 short tons of tuna was made during the 1967 season, and about 20 percent of this catch was attributed to the use of isotherm maps. The increased value to the fishermen of the catch was about $100,000, which was attained with an outlay of slightly over $6,000 for the mapping.

[Abstracter: M. F. Tripple]

0.6 SORPTION PHENOMENA IN FOODS

Labuza, T. P. (Department of Food Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139)
Food Technology 22, No. 3, 15-17, 20, 22, 24 (March 1968)

The sorption isotherm of a food material is described as a plot of the amount of water adsorbed on the food as a function of the relative humidity or activity of the vapor space surrounding the material. The amount of water adsorbed is the amount held after equilibrium has been reached at a constant temperature. An isotherm curve can be obtained by one of two approaches. An adsorption isotherm is obtained by placing a completely dry material in various atmospheres of increasing relative humidity and measuring the weight gain due to water. A desorption isotherm is obtained by placing the wet material in atmospheres of the same relative humidities; however, in this case, the loss in weight is measured.

An increasing amount of attention has been given to the sorption properties of foods in recent years. These properties are being examined in light of their effect on the storage stability of dehydrated products, as well as of their effects on diffusion of water vapor, under conditions such as those involved in removing the final traces of water from foods. The object of this review is to clarify the various isotherm models proposed for the description of the state of water in foods at low moisture contents. The author points out the technological advantages that this knowledge can contribute to processing.

[38 references] [Abstracter: M. F. Tripple

2.119 STEP FORWARD IN LIFE-SAVING

Anonymous
The Export Council of Norway Press Service, p. 5 (October 1966)
World Fisheries Abstracts 17, No. 4, 1 (October-December 1966)

"The Floating Igloo," a Norwegian-made compact life raft, completely satisfies the requirements of the International Convention for Safety at Sea, London, May 1960. It is patented and certified for all types of ships by the Norwegian Bureau of Shipping.

The life raft is made in five sizes--for 6, 10, 14, 16, or 20 men. It is quadrangular and is manufactured from pore-tight foam plastic with an all-over nylon fabric cover. The consistency of the material assures that under no circumstances will the life raft go down--it will float even if it is flung against the ship's side, against wreckage, or on rocks or coral reefs--even a machine-gun volley cannot sink it. Since the floating igloo has a raft on both top and bottom, it is immaterial which side turns up when the igloo is launched.

[Extractor: L. Baldwin]

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SHELLFISH AND CRUSTACEANS

FOOD TECHNOLOGY

OCEANOGRAPHY

SAFETY AT SEA
FACTORYSHIPS

3.2342 (Cross Reference: 1.87)
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## BRINE FREEZING OF PACKED ROCK LOBSTER TAILS

Nachenius, R. J., and A. Brogneaux
A.R. Fishing Indus. Res. Inst., South Africa pp. 27-28 (1965)
World Fisheries Abstracts 18, No. 3, 36 (July-September 1967)

The feasibility of brine-freezing rock lobster tails that were prepacked in perforated metal containers was assessed. Twenty pounds of the tails were packed in a standard-sized (17 in. x 14 in. x 4.5 in.) aluminum container fitted with thermocouples. The container was then immersed in sodium chloride brine saturated with excess salt. The brine, which was kept vigorously stirred, was maintained near its eutectic temperature by the addition of ice.

In two separate tests, the slowest cooling tails were found in the center of the container. With an average brine temperature of -4° F., these tails took about 2-3/4 hr. to cool from 65° F. to 0° F. This cooling rate compares favorably with an optimum cooling time of about 18 hr. achieved with the conventional piperack or airblast freezers used in industry. [Extractor: L. Baldwin]

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3.2341 FLUIDIZED BED TECHNIQUES IN REFRIGERATION

Meadows, V. S.
Chemical Abstracts 66, No. 5, 18118s (January 30, 1967)



7.51 (Cross Reference: 1.87)
(*)

## AN ELECTRONIC METHOD FOR COUNTING LOBSTER (HOMARUS AMERICANUS MILNE EDWARDS) HEMOCYTES AND THE INFLUENCE OF DIET ON HEMOCYTE NUMBERS AND HEMOLYMPH PROTEINS

Stewart, James E., John W. Cornick, and J. R. Dingle (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia)
Canadian Journal of Zoology 45, pp. 291-304 (1967)

A salt solution plus a concentration of polyoxyethylene sorbitan monooleate maintained at pH 7.6 was capable of preserving lobster hemolymph cells (hemocytes) and plasma. The solution had a conductivity suitable for the application of an electronic particle counter to the counting of hemocytes. A comparison of the visual and electronic counting methods showed excellent agreement; the correlation coefficient between hemocyte counts obtained by the two methods was 0.985. The electronic counting method was more precise, accurate, and rapid than the visual method. Application of the counting method to lobsters held captive showed that the hemocyte levels and the hemolymph protein levels were intimately related to diet and, to a lesser degree, to temperature. The authors believe that the use of hemocyte and hemolymph protein levels as indices of the nutritional adequacy of a diet appears to be warranted. Quantitative electrophoretic measurements showed that the percentage reduction in plasma proteins was about equal for the three major components, which together represent about 98 percent of the total hemolymph proteins. [23 references] [Abstracter: M. F. Tripple]

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6.190 (*)

## TVA [TENNESSEE VALLEY AUTHORITY] LAKES FISH MEAL

Anonymous
Tennessee Farm and Home Science, Progress Report 65 (University of Tennessee, Knoxville)
Feedstuffs 40, No. 25, 28, 30 (June 22, 1968)

A total of 480 broiler-type cockerel chicks were used in a study on the effects of several levels of fish meals on growth, feed efficiency, and xanthophyll pigmentation. The fish meals were prepared from shad and carp taken from lakes of the Tennessee Valley Authority (TVA). Each fish meal was added to a basal diet to supply fish protein at levels equivalent to those supplied by 2, 4, 6, 8, and 16 percent of a high-quality menhaden fish meal. A diet containing no fish meal was fed to a group of chicks as a negative control.

The average body weight and feed efficiency of the chicks did not differ significantly between treatment groups. Skin pigmentation of the chicks generally increased as the level of fishmeal supplementation in the diet increased. At the 2, 4, and 6 percent levels of supplementation, chicks fed diets containing shad fish meal were lighter in color than those fed diets containing carp or menhaden fish meals. No evidence of thiamine deficiency was noted in the chicks.

On the basis of the results, fish meals made from shad and carp appear to be equal to menhaden fish meal for growth and feed efficiency. Carp fish meal is equal to menhaden fish meal in chick pigmentation properties.

[Abstracter: M. F. Tripple]

*Items on back of card.



9.19 (*)

## OIL BOOM PROTECTS SHELL FISH BEDS

Anonymous
Fishing News International 7, No. 6, 67 (June 1968)

An antipollution oil boom and oil recovery unit being manufactured in Norway are likely to prove effective for protecting oyster beds and shellfish in shallow waters from the effects of oil spillage. The boom consists of polyvinyl chloride plastic pressed into nylon cloth from both sides. In essence, it is a flexible, floating wall designed to be stretched around the spillage area with its ends connected to the oil recovery unit. By means of lines running through rings attached to the upper and lower edges of the boom, it can be contracted in a longitudinal direction to reduce the enclosed area and increase the thickness of the oil layer to facilitate removal of the oil.

The recovery unit is used when the oil has been encircled by the boom. A paddle wheel conveys the oil-polluted water to a chamber where the oil and water are separated. The oil collects in an accumulator, from which it is pumped into tanks. The recovery unit is on an 18-ft. barge, which has a capacity for about 6 tons of oil in seven tanks. The craft has a diesel engine installed on deck that drives the oil pump and the paddle wheel. The pump has a capacity of 10 tons an hour.

[Abstracter: M. F. Tripple]

*Items on back of card.

p.53 (Cross Reference: 3.339)

STUDIES ON IMPROVEMENT OF CANNED PRODUCTS.
II - CAT PREFERABLE SUBSTANCES

Higasi, H., and M. Takei
Bulletin of the Tokai Regional Fisheries Research Laboratory 46, 51-59 (May 1966)
(In Japanese)
World Fisheries Abstracts 19, No. 1, 1-2 (January-March 1968)

As a followup of a previous work, the authors studied seafoods that are preferred by cats. Some of the findings follow.

1. Kittens prefer sardine and bonito to horse mackerel; they do not like flat fish, saury, or red salmon.

2. Kittens seem to like the following equally well: red meat and common meat, fresh meat and stale meat, meat containing intestines and meat free of intestines, meat that contains 1 percent NaCl and meat that is salt free, meat having a moisture content of 76 percent and meat having a moisture content of 67 percent.

3. Kittens preferred a food containing several substances--boiled shortneck clam, extract of bonito, musk xylene, and sodium-glutamic acid.
[Extractor: L. Baldwin]

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6.54 SCIENCE OF KAMABOKO (FISH PASTE)

Okada, Minoru (Tokai Reg. Fish. Res. Inst., Tokyo, Japan)
Chemical Abstracts 68, No. 25, 113365v (June 17, 1968)

3.2345 NUMBER OF FROZEN SEAFOOD PROCESSORS INCREASED 774% OVER PAST 20 YEARS

Anonymous
Quick Frozen Foods 30, No. 4, 265-266, 268 (November 1967)

In 1947, there were 107 domestic and foreign firms processing frozen seafood; in 1957, there were 460; and in 1967, there were 935. In 1947, seafood firms processed 14.5 percent of all frozen foods; in 1967, they processed 44.9 percent. Of the 935 seafood firms in 1967, 529 processed fish (120 of these processed cod) and 406 processed shellfish (191 of these processed shrimp).

The total number of processors for all frozen products rose from 737 in 1947 to 1,723 in 1957 (an increase of 20.8 percent) to 2,084 in 1967, an increase of 182.8 percent for the 20-year period. Over the same period, the number of frozen fish processors rose 329.9 percent from 1947 to 1957, 103.3 percent from 1957 to 1967, and 774.0 percent from 1947 to 1967.
[Abstracter: L. Baldwin]

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3.2349 SVENSKA INSTITUTET FOR KONSERVERINGSFORSKNING
[SWEDISH INSTITUTE FOR FOOD PRESERVATION]

Anonymous
Bull. Inst. Inter. Froid 47, No. 6, 2034, 2036 (1967)
Food Science Abstracts 2, No. 3, Abstract No. 68/321, p. 110 (March 1968)

In Sweden, a new process for flash-freezing foodstuffs that cannot be frozen satisfactorily by other methods, the changes that occur in the structure of fish muscle during freezing and thawing, and the effect of freeze drying on meat are being studied.

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9.19 METHODS OF EFFLUENT TREATMENT

Judell, T. L. (Water and Trade Wastes Consultants Pty. Ltd., Sydney, Australia)
Food Manufacture 43, No. 4, 27-29 (April 1968)

This series of three articles covers the various aspects of treating effluent. The first article outlines the principal method of processing effluent from food factories. The second deals with specific sections of the food industry. The third discusses aspects of factory location and makes some suggestions regarding the site of new factories. [Abstracter: M. F. Tripple]

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9.19 DISCHARGES OF LOW-ACTIVITY, RADIOACTIVE, EFFLUENT FROM THE WINDSCALE WORKS INTO THE IRISH SEA

Howells, H. (U.K. At. Energy Authority, Windscale, Calder Works, Windscale, England)
Chemical Abstracts 67, No. 6, 25277a (August 7, 1967)

9.19 REACTIONS OF RADIONUCLIDES FROM THE HANFORD REACTORS WITH COLUMBIA RIVER SEDIMENTS

Nelson, J. L., R. W. Perkins, J. M. Nielsen, and W. L. Haushild (Battelle Memorial Inst., Pacific Northwest Lab., Richland, Washington)
Chemical Abstracts 67, No. 6, 25269r (August 7, 1967)

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7.51 IDENTIFICATION OF FISH SPECIES BY THIN-SLAB POLYACRYLAMIDE GEL ELECTROPHORESIS OF THE MUSCLE MYOGENS

Cowie, W. P. (Unilever Research Laboratory (Colworth), Greyhope Road, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 19, No. 4, 226-229 (April 1968)

Electrophoretic band patterns for 20 commercially important fish species were obtained by electrophoresis of the fish muscle myogens on thin slabs of polyacrylamide gel. Each band pattern was characteristic of one species of fish and was practically unaltered by ice storage or frozen storage of the fish. Thus, it was possible to identify any fresh and frozen fillet belonging to the 20 species by comparing the band pattern with standards. The method can be used to identify two species of fresh fish in a mixture, but it cannot be used with cooked fish. [Abstracter: M. F. Tripple

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7.51 ABDUCTIN: A RUBBER-LIKE PROTEIN FROM THE INTERNAL TRIANGULAR HINGE LIGAMENT OF PECTEN

Kelly, Robert E., and Robert V. Rice (Mellon Institute, Pittsburgh, Pennsylvania and Marine Biological Laboratories, Woods Hole, Massachusetts)
Science 155, No. 3759, 208-210 (January 13, 1967)

The rubberlike internal triangular hinge ligament of scallops was studied by light and electron microscopy, X-ray diffraction, and chemical analysis. It was found to be composed of an amorphous protein, abductin. The physical properties of abductin are similar to those of elastin and resilin, but the amino-acid characteristics are different. Abductin is characterized by high concentrations of glycine and methionine. [16 references] [Abstracter: M. F. Tripple]

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BYPRODUCTS

PROCESSING FROZEN FISH

POLLUTION
ORGANIC COMPOSITION

ORGANIC ANALYSIS

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